Draft Final

VOLUME II
ALLEN HARBOR LANDFILL REMEDIAL INVESTIGATION REPORT:

HUMAN HEALTH RISK ASSESSMENT
TECHNICAL REPORT & APPENDICES A-D

NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RHODE ISLAND

Contract No. N62472-86-C-1282
June, 1994

Prepared For:
Northern Division
Naval Facilities Engineering Command
Lester, Pennsylvania

TRC
TRC Environmental Corporation

Draft Final

U.S. DEPARTMENT OF THE NAVY
INSTALLATION RESTORATION PROGRAM

VOLUME II
ALLEN HARBOR LANDFILL
REMEDIAL INVESTIGATION REPORT:

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5 Waterside Crossing
Windsor, CT 06095
☎ (203) 289-8631 Fax (203) 298-6399

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EXECUTIVE SUMMARY

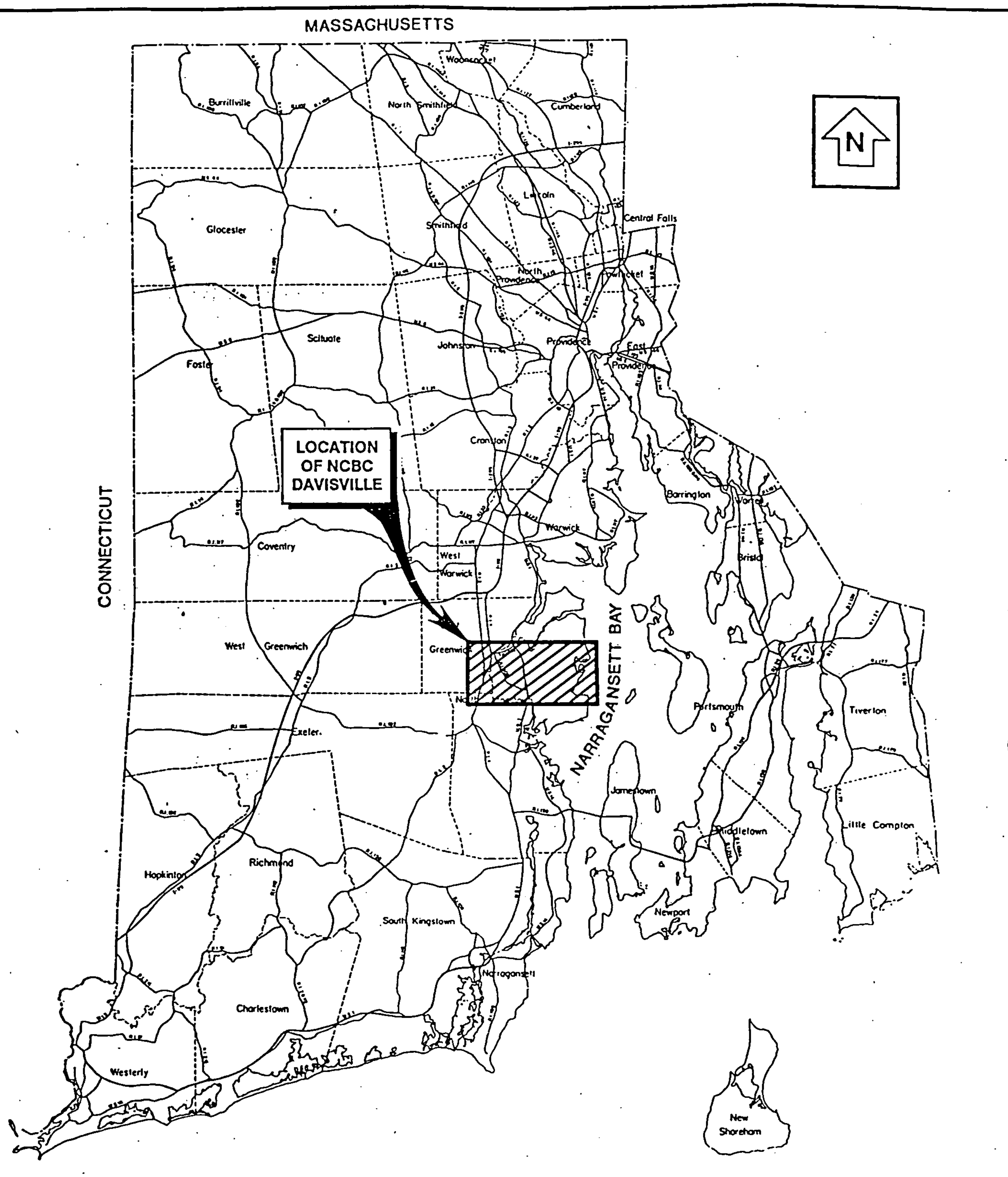
A Remedial Investigation (RI) was conducted at the Naval Construction Battalion Center in Davisville, Rhode Island (NCBC Davisville). The RI was conducted by TRC Environmental Corporation (TRC) as part of the Department of Defense Installation Restoration Program, which is similar to the U.S. Environmental Protection Agency's (EPA's) Superfund Program. The NCBC Davisville facility is currently listed on the U.S. EPA National Priorities List (NPL). The facility is located in the northeastern section of the Town of North Kingstown, Rhode Island, approximately 18 miles south of the state capital, Providence (Figure ES-1).

The Phase I RI (TRC Environmental Consultants, Inc. (TRC-ECI), 1991a) and the Phase I Human Health Risk Assessment (HHRA) (TRC-ECI, 1991b) present the results of Phase I field activities and assessment of potential health risks for the following NCBC Davisville sites (Figure ES-2):

- Site 02 - Battery Acid Disposal Area
- Site 03 - Solvent Disposal Area
- Site 05 - Former Transformer Oil Disposal Area
- Site 06 - Solvent Disposal Area
- Site 07 - Calf Pasture Point
- Site 08 - Film Processing Disposal Area
- Site 09 - Allen Harbor Landfill
- Site 10 - Camp Fogarty
- Site 11 - Fire Fighting Training Area
- Site 13 - Disposal Area Northwest of Buildings W-3, W-1, T-1

A Phase II RI is currently underway at the above-listed sites.

This volume (Volume II) presents the results of the Phase II HHRA for Site 09, describing the constituents of potential concern (COCs), assessing potential exposure pathways and constituent toxicity, and characterizing the potential health risks for Site 09. This Phase II



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SCALE

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5 Waterside Crossing
Windsor, CT 06095
(203) 289-8631

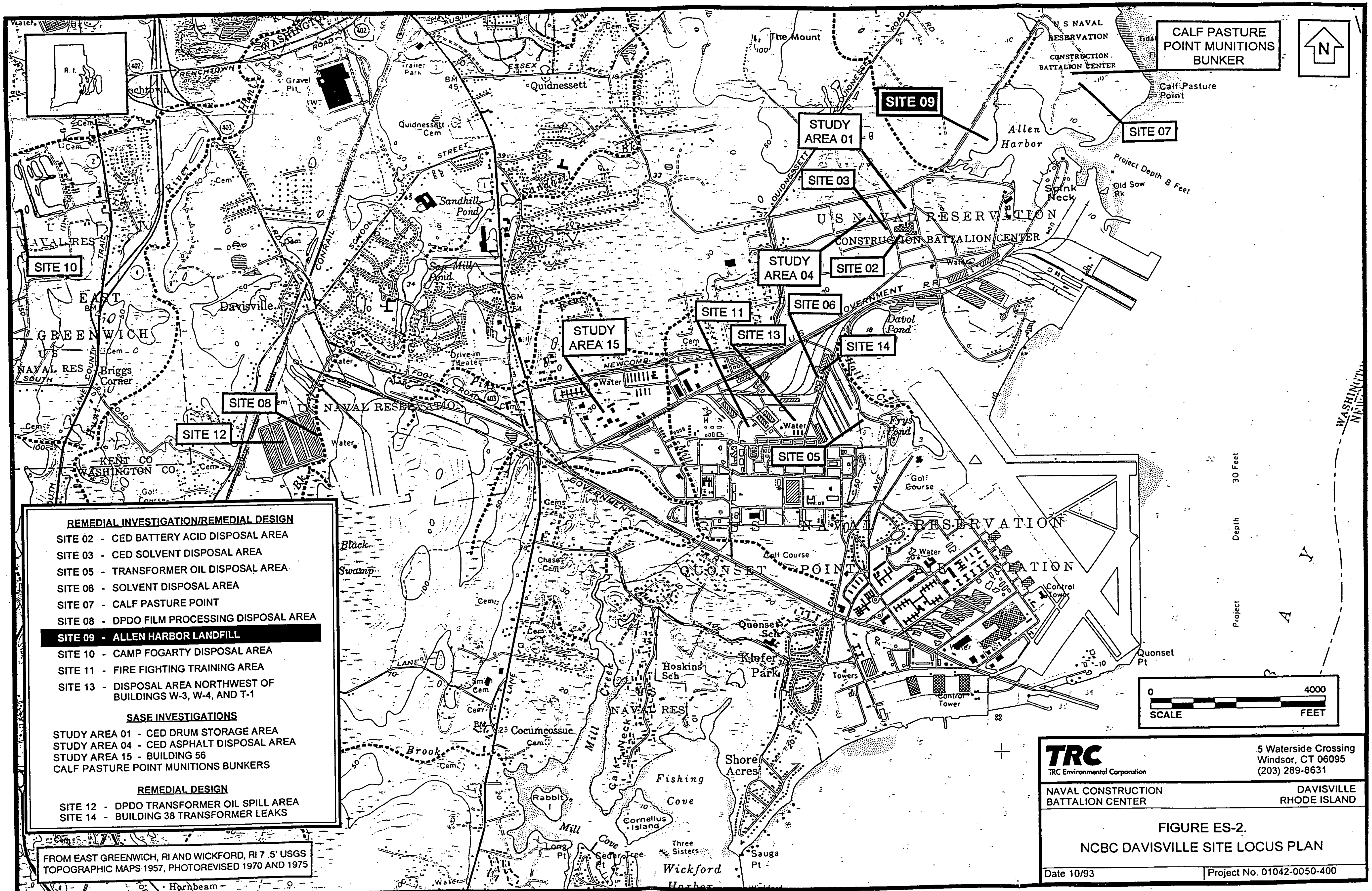
NAVAL CONSTRUCTION BATTALION CENTER

DAVISVILLE RHODE ISLAND

FIGURE ES-1.

NCBC SITE LOCATION PLAN

Date 10/93 | Project No. 01042-0050-400


CALF PASTURE POINT MUNITIONS BUNKER
SITE 09
STUDY AREA 01
SITE 07
SITE 03
STUDY AREA 04
SITE 02
SITE 10
SITE 06
SITE 11
SITE 13
STUDY AREA 15
SITE 14
SITE 08
SITE 12
SITE 05
U S NAVAL RESERVATION
CONSTRUCTION BATTALION CENTER
QUONSET POINT NAVAL AIR STATION
EAST GREENWICH
Allen Harbor
Davisville
Quidnessett
Calf Pasture Point
Project Depth 8 Feet
Project Depth 30 Feet
Quonset Pt
Fishing Cove
Wickford Harbor
REMEDIAL INVESTIGATION/REMEDIAL DESIGN
SITE 02 - CED BATTERY ACID DISPOSAL AREA
SITE 03 - CED SOLVENT DISPOSAL AREA
SITE 05 - TRANSFORMER OIL DISPOSAL AREA
SITE 06 - SOLVENT DISPOSAL AREA
SITE 07 - CALF PASTURE POINT
SITE 08 - DPDO FILM PROCESSING DISPOSAL AREA
SITE 09 - ALLEN HARBOR LANDFILL
SITE 10 - CAMP FOGARTY DISPOSAL AREA
SITE 11 - FIRE FIGHTING TRAINING AREA
SITE 13 - DISPOSAL AREA NORTHWEST OF BUILDINGS W-3, W-4, AND T-1
SASE INVESTIGATIONS
STUDY AREA 01 - CED DRUM STORAGE AREA
STUDY AREA 04 - CED ASPHALT DISPOSAL AREA
STUDY AREA 15 - BUILDING 56
CALF PASTURE POINT MUNITIONS BUNKERS
REMEDIAL DESIGN
SITE 12 - DPDO TRANSFORMER OIL SPILL AREA
SITE 14 - BUILDING 38 TRANSFORMER LEAKS
FROM EAST GREENWICH, RI AND WICKFORD, RI 7 .5' USGS TOPOGRAPHIC MAPS 1957, PHOTOREVISED 1970 AND 1975
0
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TRC Environmental Corporation
5 Waterside Crossing
Windsor, CT 06095
(203) 289-8631
NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE RHODE ISLAND
FIGURE ES-2.
NCBC DAVISVILLE SITE LOCUS PLAN
Date 10/93
Project No. 01042-0050-400

HHRA incorporates the data collected during Phase I and Phase II and supersedes the results and conclusions of the Phase I HHRA. The Phase II RI field activities and data for Site 09 are provided in Volume I of this report. Volume III of this report presents the Ecological Risk Assessment (ERA) for the entire NCBC Davisville facility. The ERA evaluates current and potential future risks to biological receptors and generally follows the steps included in the HHRA.

PURPOSE AND METHODOLOGY

The primary objectives of the HHRA are to:

- Examine exposure pathways and constituent concentrations in environmental media;
- Estimate the potential for adverse effects associated with the COCs under current and future land use conditions;
- Provide a risk management framework upon which decisions can be made regarding what actions, if any, should be taken at the site;
- Identify site or land use conditions that present unacceptable risks; and
- Provide a basis from which recommendations for future activities at the site can be made which are protective of human health.

The HHRA follows guidelines established by EPA in the Supplemental Risk Assessment Guidance for the Superfund Program, Part 1 - Guidance for Public Health Risk Assessments (1989b) and the Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part A) (1989a).

HAZARD IDENTIFICATION

COCs have been evaluated and identified for the various media identified at Site 09. The field investigations were conducted in two separate phases and included the collection of soil gas, surface soil, subsurface soil, ground water, aqueous seeps/leachate, surface water, and sediment samples. Shellfish data from a separate investigation focusing on sample collection in Allen Harbor are also included in this HHRA. Constituents observed as a result of these investigations include volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), dioxins/furans, pesticides, polychlorinated biphenyls (PCBs), and inorganics. For each medium, the validated analytical data were evaluated and organized into a form manageable and appropriate for the HHRA using EPA guidance (1989a, 1989b, 1992b). The COCs are identified on the basis of this evaluation, and a determination made as to which constituents would be addressed qualitatively and/or quantitatively in the HHRA.

DOSE-RESPONSE ASSESSMENT

The toxic effects of each COC are evaluated, including effects associated with exposure and concentrations at which such effects may be expected to occur, when available. For oral and inhalation exposure, chronic and subchronic non-carcinogenic reference doses (RfDs) and cancer slope factors are identified. In the absence of inhalation toxicity values, oral toxicity values are used provided that these values are not based on effects evident only at the point of contact (e.g., stomach tumors following ingestion). Oral toxicity values are also used to assess the potential cancer and non-cancer risks from dermal exposures to cadmium, PCBs, and tetrachlorodibenzodioxin (TCDD). Differences in oral versus dermal absorption for these constituents are taken into account through the use of relative absorption factors (RAFs) in the exposure assessment. In the absence of subchronic toxicity values, chronic values are used. In a few instances, toxicity values are also cross-assigned from one constituent to a closely related constituent (e.g., slope factor for benzo(a)pyrene to the other carcinogenic polynuclear aromatic hydrocarbons (PAHs), non-cancer oral RfDs for 4,4'-DDT to 4,4'-DDD and 4,4'-DDE). All cross-assignments are clearly indicated in this section of the HHRA. In all cases, no more than one cross-assignment of a toxicity value (constituent to constituent and then oral to inhalation would be an example of two cross-assignments) is made.

EXPOSURE ASSESSMENT

The exposure assessment involves consideration of potential receptor populations and migration pathways by which constituents could potentially be transported to other media. Specific exposure scenarios are developed to represent potential situations in which humans may be exposed to on-site constituents.

Potential human exposure scenarios developed for evaluation at Site 09 include the following:

- Scenario 1 (Future Construction) - Exposure to adult workers to subsurface soils for a one year period assuming construction of commercial or other buildings.
- Scenario 2 (Future Recreation) - Exposure of children and youths (2 to 18 years) to on-site surface soils and to on-site ground water during showering through access to recreational areas. Also, exposure of children and youths to surface water while swimming in Allen Harbor.
- Scenario 3 (Future Shellfishing) - Exposure of future off-site adult residents (30 years as adults) through ingestion of constituents in clams, mussels, and oysters obtained from Allen Harbor.

The scenarios selected are based on the September 1993 Comprehensive Reuse Plan for the NCBC Davisville facility (provided in Appendix B of this report) and are aimed toward addressing the key media relevant to human health on-site (i.e., surface soil, subsurface soil, and ground water) and off-site (i.e., surface water and shellfish).

Assumptions used in evaluating each exposure scenario are developed to be conservative yet representative of current and anticipated future conditions. Uncertainties associated with these assumptions are addressed for each scenario.

For each COC, a geometric mean and maximum detected concentration is determined. Using the mean and maximum concentrations, constituent exposure doses are quantified for each COC in each scenario-specific pathway. The exposure doses based on maximum concentrations are referred to as estimates of reasonable maximum exposure (RME) by EPA Region I.

RISK CHARACTERIZATION

Human health risks are presented with regard to potential effects from the COCs. These effects may include potential risks of cancer or the occurrence of non-cancerous (systemic) effects. Cancer risk estimates, the lifetime incremental probabilities of excess cancer due to exposure to the site constituents, take into account exposure concentrations and the carcinogenic potencies of the constituents. Cancer risks are calculated by multiplying exposure dose by the appropriate cancer slope factor for each compound and exposure route. The cancer risk estimates are presented in scientific notation, where a lifetime risk of 1E-04 represents a lifetime risk of one in ten thousand.

For determining whether non-cancer health effects may be a concern, constituent-specific hazard quotients (HQs) are used. HQs are calculated as the ratio of the exposure dose to the RfD. The HQs are also presented in scientific notation, where an HQ of 5E-01 means the estimated exposure dose is one-half the RfD. For each pathway, the HQs are summed to determine the pathway hazard index (HI).

The calculated cancer risks and non-cancer HIs are evaluated using the available regulatory guidance. The calculated risk is compared to the acceptable lifetime cancer risk range (1E-04 to 1E-06) for evaluating the need for remediation, as stated in 40 CFR Part 300 (EPA, 1990b). EPA (1990b) considers a cancer risk of 1E-06 as the point of departure for determining risk-based remediation goals. For non-carcinogenic risks, a target HI of unity (1E+00) is used. When the total HI for an exposed individual or group of individuals exceeds unity, there may be concern for potential non-cancer health effects. Thus, the cancer risks and non-cancer HIs that constitute a potential concern are those greater than 1E-06 and greater than 1E+00, respectively.

The estimated cancer risks and non-cancer HIs for each pathway by scenario are summarized below and in Tables ES-1 and ES-2, respectively.

As shown in Table ES-1, estimated cancer risks exceed 1E-06 for at least one exposure pathway in each of the three scenarios in the Site 09 HHRA. For Scenario 1 (future construction), cancer risks exceed 1E-06 for the incidental ingestion of soil pathway only. Arsenic, beryllium, and carcinogenic PAHs in soil are associated with individual cancer risks above 1E-06 (RME only) and thus are the COCs of primary concern. Table ES-3 provides a summary of the cancer risks calculated using the toxic equivalency factors (TEFs) for

TABLE ES-1
SUMMARY OF CANCER RISKS FOR ALL SCENARIOS
NCBC DAVISVILLE – SITE 09

Pathway	CANCER RISKS					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Incidental ingestion of soil	4E-06	1E-04	1E-05	6E-04	--	--
Dermal contact with soil	2E-08	1E-07	6E-07	7E-06	--	--
Inhalation of particulates	7E-09	5E-08	--	--	--	--
Inhalation of Volatiles During Construction	4E-09	2E-07	--	--	--	--
Dermal Contact with Ground Water While Showering	--	--	2E-07	7E-05	--	--
Inhalation of Volatiles While Showering	--	--	2E-06	8E-04	--	--
Ingestion of Surface Water While Swimming	--	--	6E-08	7E-08	--	--
Dermal Contact with Surface Water While Swimming	--	--	3E-08	3E-08	--	--
Ingestion of Clams	--	--	--	--	7E-06	1E-05
Ingestion of Mussels	--	--	--	--	8E-06	1E-05
Ingestion of Oysters	--	--	--	--	8E-06	9E-06

[shaded] = Cancer risk > 1E-06

TABLE ES-2
SUMMARY OF NON-CANCER HAZARD INDICES FOR ALL SCENARIOS
NCBC DAVISVILLE – SITE 09

Pathway	NON-CANCER HAZARD INDICES					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Incidental ingestion of soil	3E-01	3E+00	4E-02	1E+00	--	--
Dermal contact with soil	3E-04	6E-03	4E-05	4E-03	--	--
Inhalation of particulates	3E-03	2E-02	--	--	--	--
Inhalation of Volatiles During Construction	6E-04	2E+01	--	--		
Dermal Contact with Ground Water While Showering	--	--	1E-03	1E-01	--	--
Inhalation of Volatiles While Showering	--	--	5E-03	2E+00	--	--
Ingestion of Surface Water While Swimming	--	--	1E-03	2E-03	--	--
Dermal Contact with Surface Water While Swimming	--	--	2E-04	2E-04	--	--
Ingestion of Clams	--	--	--	--	3E-02	6E-02
Ingestion of Mussels	--	--	--	--	3E-02	4E-02
Ingestion of Oysters	--	--	--	--	9E-02	1E-01

▒ = Hazard index > 1E+00

TABLE ES-3
SUMMARY OF CANCER RISK ESTIMATES FOR SELECTED SCENARIOS
USING TEFs FOR CARCINOGENIC PAHs
NCBC DAVISVILLE – SITE 09

Pathway	CANCER RISKS (a)					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Incidental ingestion of soil	2E-06	3E-05	9E-06	2E-04	--	--

(a) Determined using toxic equivalency factors (TEFs) for carcinogenic PAHs; shown only for pathways for which cancer risks above 1E-06 are estimated for these constituents.

[shaded] = Cancer risk > 1E-06

carcinogenic PAHs. As shown, the pathway and individual COC cancer risks (RME only) also exceed 1E-06 when the calculations are based on these TEFs. The cancer risks estimated for the remaining three pathways (dermal contact with soil, inhalation of particulates, and inhalation of volatiles from soil) under Scenario 1 (future construction) are less than 1E-06. The non-cancer HIs for incidental ingestion of soil and inhalation of volatiles under Scenario 1 (future construction) exceed 1E+00 for the RME case. Although no COCs are associated with an HQ above 1E+00 for incidental ingestion of soil, the RME HQ for antimony equals this value. The RME non-cancer HI for inhalation of volatiles is nearly 100% attributable to toluene. The non-cancer HIs for the other two pathways, dermal contact with soil and inhalation of particulates, are less than 1E+00.

For Scenario 2 (future recreation), cancer risks exceed 1E-06 for incidental ingestion of soil, dermal contact with soil (RME only), dermal contact with ground water while showering (RME only), and inhalation of volatiles from ground water while showering. For soil ingestion, arsenic, beryllium, carcinogenic PAHs, 2,3,7,8-TCDD, and Aroclor-1260 are associated with individual cancer risks above 1E-06 and thus are the COCs of primary concern. With the exception of benzo(b/k)fluoranthene and 2,3,7,8-TCDD, the individual cancer risks for these constituents exceed 1E-06 only under the RME case. Although the mean cancer risk for benzo(b/k)fluoranthene does not exceed 1E-06 when the calculations are based on the TEFs for carcinogenic PAHs, the pathway and individual COC cancer risks (RME only) still exceed 1E-06 (Table ES-3). For dermal exposure, Aroclor-1260 (RME only) is the only COC associated with an individual cancer risk above 1E-06. For dermal contact with ground water while showering, an individual cancer risk above 1E-06 is estimated only for vinyl chloride under the RME case.

For inhalation of volatiles while showering, three COCs are associated with individual cancer risks above 1E-06 and include 1,2-dichloropropane (RME only), trichloroethene (RME only), and vinyl chloride. Cancer risks above 1E-06 are not estimated for incidental ingestion of or dermal contact with surface water while swimming. With regard to the non-cancer assessment for Scenario 2 (future recreation), inhalation of volatiles from ground water while showering is the only pathway associated with a non-cancer HI above 1E+00 (RME only). 1,2-Dichloroethene contributes almost all of this pathway HI, and is the only COC for which the non-cancer HQ exceeds 1E+00. The non-cancer HI for incidental ingestion of soil under the RME case equals 1E+00. The non-cancer HIs for the remaining pathways (dermal contact with soil, dermal contact with ground water while showering, and incidental ingestion of and dermal contact with surface water while swimming) are less than 1E+00.

For Scenario 3 (future shellfishing), cancer risks above 1E-06 are estimated for all three pathways including ingestion of clams, mussels, and oysters from Allen Harbor. Arsenic and Aroclor-1254 (RME only) are the COCs associated with individual cancer risks above 1E-06. As shown in Table ES-4, the cancer risks for ingestion of mussels from Allen Harbor are less than 1E-06 when based on the alternate ingestion rate, while for clams and mussels, the pathway cancer risks still exceed 1E-06. Further, arsenic in clams is the only COC with a cancer risk above the target level. That is, the estimated cancer risks for arsenic in mussels and oysters and Aroclor-1254 in all three shellfish types no longer exceed 1E-06 when the alternate ingestion rates are used. The non-cancer HIs for Scenario 3 (future shellfishing) do not exceed 1E+00.

TABLE ES–4
SUMMARY OF CANCER RISK ESTIMATES FOR SCENARIO 3 (FUTURE SHELLFISHING)
USING THE ALTERNATIVE INGESTION RATES
NCBC DAVISVILLE – SITE 09

Pathway	CANCER RISKS (a)					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Ingestion of Clams	--	--	--	--	3E–06	5E–06
Ingestion of Mussels	--	--	--	--	9E–08	1E–07
Ingestion of Oysters	--	--	--	--	2E–06	2E–06

(a) Determined using alternative ingestion rates for clams (442 mg/d), mussels (13 g/day), and oysters (291 mg/d)

[shaded] = Cancer risk > 1E–06

UNCERTAINTY ANALYSIS

The uncertainty analyses for each component of the HHRA identifies the major sources of uncertainty as follows:

- Assumptions about current and potential future land use; pathways through which actual or potential receptors may be exposed; and the magnitude, frequency and duration of potential exposures to the environmental media (e.g., soil, water);

- Exclusion of constituents from quantitative evaluation in the HHRA due to lack of quantitation or missing toxicity data. As discussed, the exclusion of most of these constituents is unlikely to underestimate the potential cancer risks or non-cancer HIs. For carbazole, dibenzofuran, and cobalt in soil, there is some uncertainty associated with their exclusion as toxicity-based criteria are not available for these or structurally similar constituents. For lead in soil, the potential risks may have been underestimated since the RIDEM guidance level of 300 mg/kg and/or the EPA interim cleanup level of 500 to 1,000 mg/kg are exceeded for a number of samples;

- The use of models to estimate concentrations of constituents in fugitive dust in Scenario 1 (future construction) and volatilized constituents in air from subsurface soil in Scenario 1 (future construction) and from ground water while showering in Scenario 2 (future recreation). As no HHRA-related guidance is available from EPA regarding the quantitation of constituent concentrations in air, considerable uncertainty is associated with the risks estimated for these pathways;

- Data uncertainties due to infrequent detections, limited numbers of samples, or qualified data (e.g., estimated concentrations, elevated SQLs);

- Toxicity assessment (e.g., toxicity values based on animal data, use of benzo(a)pyrene toxicity values for other carcinogenic PAHs); and

- Potential interactions between carcinogens and between non-carcinogens which could lead to increased or diminished carcinogenic responses or toxicity.

- The cancer risks for Scenario 3 (future shellfishing) are reflective of Allen Harbor. Given the small number of samples collected near the Allen Harbor landfill, it is not possible to determine whether or not the estimated cancer risks are site-related.

The key uncertainties associated with the constituents with cancer risks above 1E-06 are as follows:

- Arsenic in surface soil (Scenario 2 (future recreation)), subsurface soil (Scenario 1 (future construction)), and shellfish (Scenario 3 (future shellfishing)):

  - Arsenic concentrations in surface and subsurface soil are similar to those for NCBC Davisville background.

  - Cancer risks for arsenic in surface soil and subsurface soil only exceed 1E-06 under the RME (maximum concentration-based) case.

  - Arsenic concentrations in Allen Harbor shellfish are similar to those in shellfish collected or deployed in Narragansett Bay.

  - Substitution of the ingestion rate in Narragansett Bay Project (n.d.) with alternate ingestion rates provided in EPA (1990a) results in cancer risks for arsenic in mussels and oysters that no longer exceed 1E-06.

- Beryllium in surface soil (Scenario 2 (future recreation)), and subsurface soil (Scenario 1 (future construction)):

  - Cancer risks for beryllium in surface soil and subsurface soil only exceed 1E-06 under the RME (maximum concentration-based) case.

- 1,2-Dichloropropane, trichloroethene, and vinyl chloride in ground water (Scenario 2 (future recreation)):

  - Cancer risks for these VOCs only exceed 1E-06 under the RME (maximum concentration-based) case. The maximum detected concentrations for these VOCs exceed the next highest concentration as follows; 4-fold for 1,2-dichloropropane, 16-fold for trichloroethene, and 280-fold for vinyl chloride.

  - Use of a model to estimate the air concentrations of VOCs in air while showering. HHRA-related EPA guidance for such estimations is not available.

  - Use of the oral slope factor for 1,2-dichloropropane to assess inhalation exposures to this constituent in the absence of an inhalation slope factor.

- Carcinogenic PAHs in surface soil (Scenario 2 (future recreation)) and subsurface soil (Scenario 1 (future construction)):

  - Cancer risks for carcinogenic PAHs in surface soil and subsurface soil only exceed 1E-06 under the RME (maximum concentration-based) case.

- Use of the benzo(a)pyrene slope factor for the other carcinogenic PAHs overestimates the potential cancer risks by roughly 2-fold.

- Aroclor-1260 in surface soil (Scenario 2 (future recreation)), and Aroclor-1254 in shellfish (Scenario 3 (future shellfishing)):

  - Cancer risks for Aroclor-1260 in surface soil and Aroclor-1254 in shellfish only exceed 1E-06 under the RME (maximum concentration-based) case. Note that the maximum detected concentrations of Aroclor-1254 in shellfish were reported for samples obtained away from the Allen Harbor landfill.

  - Use of the oral slope factor to assess dermal exposures to Aroclor-1260 in surface soil.

  - Substitution of the ingestion rate in Narragansett Bay Project (n.d.) with alternate ingestion rates provided in EPA (1990a) results in cancer risks for Aroclor-1254 in clams, mussels, and oysters that no longer exceed 1E-06.

The key uncertainties associated with the constituents with HQs above 1E+00 include:

- 1,2-Dichloroethane in ground water (Scenario 2 (future recreation)):

  - HQs for 1,2-dichloroethene in ground water only exceed 1E+00 under the RME (maximum concentration-based) case. The next highest concentration is 55-fold less than the maximum.

  - Use of a model to estimate the concentrations of 1,2-dichloroethane in air while showering. HHRA-related EPA guidance is not available for such estimations.

  - Use of the oral RfD to assess inhalation exposures in the absence of an inhalation RfD.

- Toluene in subsurface soil (Scenario 1 (future construction)):

  - HQs for toluene in subsurface soil only exceed 1E+00 under the RME (maximum concentration-based) case. The next highest concentration is six orders of magnitude less than the maximum.

  - Use of models to estimate the concentrations of toluene in ambient air during construction activities. HHRA-related EPA guidance is not available for such estimations.

- Use of the chronic inhalation RfD to assess subchronic exposures during construction in the absence of a subchronic inhalation RfD.

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES
(Continued)

APPENDICES

APPENDIX

LIST OF ACRONYMS

ACRONYM	DESCRIPTION
B	Boring
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CLP	Contract Laboratory Program
CBC	Construction Battalion Center
CDD	Chlorinated Dibenzo-*p*-dioxin
CDF	Chlorianted Dibenzofuran
COC	Constituent of Potential Concern
CRQL	Contract Required Quantitation Limit
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ERLN	Environmental Research Laboratory at Narragansett
GC/MS	Gas Chromatography/Mass Spectrometry
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	Hazard Index
HpCDD	Heptachlorodibenzo-*p*-dioxin
HpCDF	Heptachlorodibenzofuran
HQ	Hazard Quotient
HxCDD	Hexachlorodibenzo-*p*-dioxin
HxCDF	Hexachlorodibenzofuran
IRIS	Integrated Risk Information System
K_{ow}	Octanol-Water Partition Coefficient
Kp	Dermal Permeability Constant
MDL	Method Detection Limit
MW	Monitoring Well
NCBC Davisville	Naval Construction Battalion Center in Davisville, Rhode Island
NOSC	Naval Oceans Systems Center
NPL	National Priorities List
OCDD	Octachlorodibenzo-*p*-dioxin
OCDF	Octachlorodibenzofuran
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PeCDD	Pentachlorodibenzo-*p*-dioxin
PeCDF	Pentachlorodibenzofuran
QA/QC	Quality Assurance/Quality Control
RAF	Relative Absorption Factor
RAGS	Risk Assessment Guidance for Superfund
RfC	Reference Concentration
RfD	Reference Dose

LIST OF ACRONYMS
(Continued)

ACRONYM	DESCRIPTION
RI	Remedial Investigation
RIDEM	Rhode Island Department of Environmental Management
RME	Reasonable Maximum Exposure
SDRC	Sample Duplicate Recollect
SRC	Sample Recollect
SQL	Sample Quantitation Limit
S	Surface Soil
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCB	Trichlorobiphenyl
TCDD	Tetrachlorodibenzo-*p*-dioxin
TCDF	Tetrachlorodibenzofuran
TCLP	Toxicity Characteristic Leaching Procedure
TCL	Target Compound List
TEF	Toxic Equivalency Factor
TIC	Tentatively Identified Constituent
TOC	Total Organic Carbon
TP	Test Pit
TRC	TRC Environmental Corporation
TRC-ECI	TRC Environmental Consultants, Inc.
VOC	Volatile Organic Compound

1.0 OBJECTIVES OF BASELINE HEALTH RISK ASSESSMENT

This report provides the quantitative human health risk assessment (HHRA) prepared by TRC Environmental Corporation (TRC) for Site 09 - Allen Harbor Landfill, located at the Naval Construction Battalion Center in Davisville, Rhode Island (NCBC Davisville).

The primary objectives of the HHRA are to identify the constituents of potential concern (COCs) in the environmental media, characterize the potential (current and future) land uses and exposure pathways, and estimate the potential for adverse human health effects for the identified COCs and exposure conditions. The HHRA follows guidelines established by the U.S. Environmental Protection Agency (EPA, 1989a and 1989b).

Specific exposure scenarios are considered and developed that represent potential situations in which humans may be exposed to constituents originating from the site. Efficacy of specific remedial programs is not included as part of this analysis.

Human health risks associated with the site are presented with regard to potential effects from the COCs. These effects may include potential risks of cancer or occurrence of non-cancerous (systemic) effects. A quantitative HHRA for carcinogens involves calculations of the lifetime incremental probabilities of cancer that take into account exposure estimates and the carcinogenic potencies (i.e., slope factors) for the constituents. For determining whether non-cancer health effects may be a concern, constituent-specific hazard quotients (HQs) are used which incorporate the exposure estimates and the acceptable exposure levels (i.e., the reference doses (RfDs)) for the constituents.

Ultimately, the HHRA presented in this report is expected to be used within a risk management framework. In making decisions concerning what actions, if any, should be taken at a site (including, for example, the collection of additional data or implementation of a remedial program), the results of the HHRA should be used in concert with other information on the site. The HHRA identifies whether current or anticipated future land use conditions present unacceptable risks. The results of the HHRA also identify constituents and exposure pathways contributing the greatest risk to the receptor populations. From this information, recommendations for future activities at the site (including remedial alternatives) can be made such that public health is protected.

2.0 METHODOLOGY

The HHRA methodology is structured utilizing the most current methods accepted by the EPA as described in the Region I Supplemental Risk Assessment Guidance for the Superfund Program, Part 1 - Guidance for Public Health Risk Assessments (1989b) and the Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part A) (1989a). Where assumptions are made, they are realistic but conservative, i.e., protective of public health. In keeping with accepted practices for conducting such assessments, all assumptions are carefully discussed and an assessment made of the uncertainty associated with the overall health risk estimates.

Following the guidelines accepted by the EPA, the basic components of the HHRA are organized and presented for Site 09 of the NCBC Davisville facility as follows:

- Hazard Identification;
- Dose-Response Assessment;
- Exposure Assessment;
- Risk Characterization; and
- Uncertainty Assessment.

The first four components are discussed generally below. Specifics for these four components which relate to the site (i.e., selection of COCs for the site, exposure scenarios considered at the site, and risk characterization results) are provided in Section 3. The uncertainty assessment is presented in Section 4.

2.1 Hazard Identification

This section of the HHRA summarizes the nature and extent of contamination and identifies the COCs for each medium (e.g., soil, ground water, surface water, and shellfish). The components of the hazard identification include a site description, overview of the data collection, data evaluation, and selection of COCs. The following provides a general description of the hazard identification process, with site-specific information provided in Section 3.

2.1.1 Facility Description and History

The NCBC Davisville facility is located in the northeastern section of the Town of North Kingstown, Rhode Island, approximately 18 miles south of the state capital, Providence (Figure 2-1). A significant portion of the NCBC Davisville facility is contiguous with Narragansett Bay. The facility is composed of three areas including the Main Center, the West Davisville storage area, and Camp Fogarty, a training facility located approximately 4 miles west of the Main Center (Figure 2-2). Adjoining the NCBC Davisville facility southern boundary is the decommissioned Naval Air Station (NAS) Quonset Point which was excessed by the Navy to the Rhode Island Port Authority (RIPA) in April 1973.

Quonset Point was the location of the first annual encampment of the Brigade Rhode Island Militia in 1893. During World War I, it was a campground for the mobilization and training of troops and later was the home of the Rhode Island National Guard. In the 1920s and 1930s, it was a summer resort.

In 1939, Quonset Point was acquired by the Navy, and construction began in 1940. During construction, millions of cubic yards of sediment were dredged to create a ship basin and channel. Wartime activities at NAS Quonset Point included training aircraft carrier pilots and crews, overhauling aircraft, supplying military equipment and planes, and providing coastal defense.

By 1942, the operations at NAS Quonset Point had expanded into what is now called the NCBC Davisville facility. Land at Davisville adjacent to NAS Quonset Point was designated the Advanced Base Depot, and a pier was constructed. Later that year the Naval Construction Training Center (NCTC), known as Camp Endicott, was established to train the newly established construction battalions. By November 1942, the camp was at capacity, housing 15,000 men and 350 officers. Over 100,000 men were trained at Camp Endicott by the end of World War II.

After the war, activities at NAS Quonset Point remained the same, providing an operating base for aircraft and ships. After 1947, NAS Quonset Point was the home port of carrier-based jet squadrons. The Antarctic Development Squadron Six was moved to NAS Quonset Point in 1956. A Naval Air Rework Facility (NARF) was created there in 1967. The NARF performed overhaul and repair work previously handled by NAS Quonset Point.

The NCBC Davisville area was inactive between World War II and the Korean Conflict. In 1951, it became the Headquarters Construction Battalion Center (CBC). The CBC loaded ships and trained men for both the Korean and Vietnam Conflicts. In 1974, the NAS and NARF at Quonset Point were decommissioned, and operations at Davisville were greatly reduced. In 1989, the closure of Davisville was announced, and all operations at Davisville were phased down to the present staffing levels for Public Works, Maintenance, Security and Navy Personnel. The closure of NCBC Davisville will be completed by April 1994.

This HHRA addresses Site 09 - Allen Harbor Landfill at the NCBC Davisville facility. A separate volume contains the HHRA for Sites 02, 03, 06, 07, 10, 11, and 13. The HHRA for Site 08 has been submitted previously (TRC, 1993). Site 09 occupies approximately 15 acres on the western side of Allen Harbor. The landfill was operated from 1946 to 1972, and contains wastes generated at the NCBC Davisville facility and the former NAS Quonset Point. Typical wastes included preservatives, paint thinners, degreasers, PCBs, asbestos, ash, sewage sludge, and contaminated fuel oil. A detailed description and site history is outlined in Section 3.

2.1.2 Data Collection

Phase I

The Phase I sampling at NCBC Davisville was conducted from July 1989 to March 1990. As part of this investigation, samples of soil gas, surface soil ($\leq$2 feet), subsurface soil (>2 feet), ground water, aqueous seeps, and sediments were collected at one or more of the NCBC Davisville sites.

Soil gas samples were collected at a depth of two feet below grade and were analyzed using modified EPA Method 601 for 12 chlorinated volatile organic compounds (VOCs) and modified EPA Method 602 for benzene, toluene, ethylbenzene, and xylenes (BTEX).

Soil samples were collected at the immediate surface (0 to 6 inches), using hand augers (down to approximately four feet), as surface (0 to 2 feet) and subsurface (>2 feet) borings, and as surface (0 to 2 feet) and subsurface (>2 feet) test pit samples. Soil samples were analyzed for the Target Compound List (TCL) and the Target Analyte List (TAL). Selected soil samples were also analyzed using the Toxicity Characteristic Leaching Procedure (TCLP).

Ground water samples were collected from existing and newly installed wells. Unfiltered and filtered ground water samples were obtained from each well. Ground water samples were analyzed for TCL, TAL, and cyanide.

Aqueous seep or leachate samples were collected using 4 ounce glass jars and analyzed for TCL, TAL, and cyanide. The sediment samples were obtained using a stainless steel ladle and were analyzed for TCL, TAL, total petroleum, and/or hydrocarbons depending on the site.

Phase I sample analyses were conducted by Compuchem Laboratories, Inc. in Research Triangle Park, North Carolina.

Phase II

The Phase II sampling at NCBC Davisville was conducted from May 1993 to July 1993. During this investigation, samples of surface soil (≤2 feet), subsurface soil (>2 feet), ground water, surface water, and sediments were obtained at one or more of the NCBC Davisville sites.

Surface soil samples were collected at intervals of 0 to 1 foot, 0.5 to 1 foot, and 0 to 2 feet below grade. Subsurface soil samples were collected at intervals beginning at 2 feet below grade, with depth to the water table at each site determining the deeper end of the intervals. Soil samples were generally analyzed for TCL, TAL, and cyanide. Selected soil samples were also analyzed for total organic carbon (TOC), acid volatile sulfides, total chloride, archived dioxins/furans, sulfides, and TCLP.

Ground water samples were consistently analyzed for TCL, TAL, and cyanide. Selected ground water samples were also analyzed for total chloride.

Surface water and sediment samples were typically analyzed for TCL, TAL, cyanide, with selected analyses for TOC and acid volatile sulfides.

Phase II sample analyses were conducted by Pace in Hampton, New Hampshire, Geotesting Express in Concord, Massachusetts, or Compuchem Laboratories, Inc. in Research Triangle Park, North Carolina.

Shellfish

Shellfish sampling was conducted in Allen Harbor and Narragansett Bay in three phases from November 1988 to October 1991. The studies were collaborative efforts by the Naval Ocean Systems Center (NOSC) and the EPA Environmental Research Laboratory at Narragansett (ERLN) (NOSC, 1991; EPA, 1993c, 1994). Four indigenous species were collected including hard-shell clams (*mercenaria mercenaria*; quahogs), soft-shell clams (*mya arenaria*), ribbed mussels (*modiolus demissus*), and oysters (*crassostrea virginica*). Blue mussels (*mytilus edulis*) were deployed in cages. The samples were generally collected as composites, with more than one composite typically obtained from a given station. The resulting samples were analyzed for inorganics, SVOCs (primarily PAHs), pesticides/PCBs, and butyltins. With the exception of the butyltin analyses, the shellfish samples were analyzed by the ERLN. The butyltin analyses were performed by the NOSC facility in San Diego, California. Since the butyltin results are more relevant from an ecological rather than a human health perspective, these data are not included in the HHRA. Also note that since ribbed mussels are not generally eaten, the data associated with this species are also not included nor discussed further in the HHRA.

2.1.3 Data Evaluation

In order to organize the validated Phase I and Phase II RI data into a form manageable and appropriate for the baseline HHRA, TRC performed the steps outlined below. The validation of Phase I RI data was performed by TRC as part of the Phase I RI (TRC-ECI, 1991a, Volume I, Appendix J). Heartland Environmental Services, Inc. conducted the validation of Phase II RI data for Site 09 (ground water only), while Weston Analytics in Lionville, Pennsylvania conducted the validation of Phase II soil data for Site 09. The steps described below were conducted as part of the HHRA and are consistent with current EPA guidance (1989a, 1989b, 1992b).

1) Gather and sort all data by medium (i.e., surface soil, subsurface soil, ground water, surface water, shellfish);
2) Evaluate methods of analysis;
3) Evaluate the data qualifiers and codes;
4) Evaluate blank data (done for RI data during data validation performed prior to HHRA);
5) Evaluate duplicate data,
6) Evaluate sample recollect data,
7) Evaluate the sample quantitation limits (SQLs);
8) Evaluate tentatively identified compounds (TICs);
9) Evaluate background data (performed during selection of COCs);
10) Consider any additional factors;
11) Develop datasets by medium; and
12) Develop a set of COCs from the entire dataset for each medium.

Briefly, the general methods used for organizing and evaluating the NCBC Davisville data for use in the HHRA, which correlate with the previously described steps, include the following:

1) All analytical data was initially sorted by media. Surface soil is defined as Phase I soil samples taken at the 0 to 0.5 and 0 to 2 foot intervals, and Phase II soil samples taken across the 0 to 1, 0.5 to 1, and 0 to 2 foot intervals. Soil samples taken from the 2 to 10 foot interval are considered subsurface soil samples. Surface water, clam, blue mussel, and oyster samples collected from Allen Harbor are also included in the HHRA.

2) An evaluation of analytical methods was not considered necessary as all RI data used were analyzed by EPA's Superfund Contract Laboratory Program (CLP) procedures.

   The shellfish data were obtained using the quality assurance/quality control (QA/QC) plan prepared by Gleason and Mueller (1989; as cited and discussed in NOSC (1991)). These data are included in the HHRA per a request by EPA/RIDEM and are not evaluated here with respect to comparability to EPA's CLP protocol.

3) Data validation qualifiers are also assessed during the data evaluation process. As indicated in EPA guidance (1989a, 1989b, and 1992b), unqualified data and data qualified with a "J" qualifier are treated as detectable concentrations. Data qualified with "UJ" or "U" qualifiers are treated as non-detectable concentrations. As described in 7) below, non-detects are assigned a value equal to the SQL or one-half the SQL. With the exception of data qualified with an "R" or data for constituents not detected in any medium, all data are included in the HHRA. As described by EPA (1989a, 1992b), "J", "U", and "R" qualifiers are defined as follows:

   "J" - Value is estimated, either for a TIC or when a constituent is present but the value is less than the contract required quantitation limit (CRQL). Data qualified as estimated may be biased high or low (i.e., may overestimate or underestimate the actual concentrations).

   "U" - Constituent was analyzed for, but not detected. The value reported in the NCBC Davisville datasets corresponds to the SQL.

   "UJ" - Constituent was analyzed for, but not detected. The "J" qualifier signifies that the SQL is estimated.

"R" - Quality control assessment indicates the data are unusable and are therefore rejected for use in the HHRA. Both the presence and concentration of the constituent are uncertain.

Note: EPA (1992b) refers to EPA (1989a) for a continued discussion on the potential use of qualified data in risk assessment.

4) Field and laboratory blanks are used to segregate actual site contamination from cross contamination from field or laboratory procedures. Blank contamination is an important indicator of false positives (i.e., reported detection of a constituent that is not actually present). As indicated in EPA (1989a, 1992b), sample results are considered positive only if concentrations exceed ten times the concentration of a common laboratory contaminant in a blank, or five times the concentration of a constituent that is not considered a common laboratory contaminant. If less than five or ten times the blank concentration, the constituent is treated as non-detected in that sample and, per EPA Region I (1988b and 1988c), the SQL assumed to be equal to the value reported initially for the sample. Validation of Phase I data using all blanks (laboratory, trip and field) was conducted by TRC as part of the Phase I RI (TRC-ECI, 1991a; Volume I, Appendix J). Validation of Phase II data using all blanks was conducted by Heartland Environmental Services, Inc. for Site 09 (ground water only) and by Weston Analytics for Site 09 soil samples.

According to the Phase I shellfish report (NOSC, 1991), one blank sample was analyzed for approximately every six samples. None of these blanks contained "significant amounts (more than 10% of the lowest measured concentration) of the compounds of interest" (NOSC, 1991). The same QA/QC procedures regarding blanks were used in the Phase II and III analyses (EPA, 1993c, 1994). No further consideration of blanks for the shellfish data is included in the HHRA.

5) Sample and duplicate data are compared and a determination made as to whether these data should be averaged. Sample and duplicate sample concentrations are averaged if the two values are within 35% of each other for soil and 20% for water. Otherwise, the sample concentration is used. The difference between the sample and duplicate concentrations is estimated as:

$$\text{Relative Percent Difference} = \frac{|\text{Sample} - \text{Duplicate}|}{\text{Average}} \times 100\%$$

For the shellfish data, laboratory duplicates (i.e., those samples with the same sample identification number but different chemistry identification numbers or replicate numbers) as provided for inorganics are averaged, with no criterion for averaging applied. Multiple composite samples for the same species, station, and date are identified by different sample identification numbers and treated as separate samples in the shellfish dataset.

6) Sample recollection data are also evaluated as part of the overall data evaluation. Since sample recollect (SRC) and duplicate sample recollect (SDRC) data are typically obtained as a result of quality control parameters not being met in the initial sample analysis, the recollection data for a sample are used in place of the original data for that sample. Similar to the approach for duplicates described in 5) above, either the SRC concentration or the average of the SRC and SDRC concentrations is used depending on the variability between the two values. Specifically, the SRC and SDRC values are averaged if the two values are within 35% of each other for soil and 20% for water. Otherwise, the SRC concentration is used. Note that there are no SRC and SDRC data for shellfish.

7) Although non-detects with extremely high SQLs may be removed from datasets (EPA, 1989a), these non-detects are retained for the purposes of this HHRA based on the bias towards sampling in areas of suspected contamination during the Phase I and Phase II sampling programs. As described by Region I (EPA, 1989b), non-detects in samples from a biased sampling program have a greater probability of being contaminated than non-detects from an unbiased program. In calculating exposure point concentrations, a value of one-half the SQL is assigned to non-detects with extremely elevated SQLs. SQLs which are ten times the "normal" SQL are generally considered extremely elevated. For example, given a "normal" SQL of 330 μg/kg for semi-volatile organic compounds (SVOCs) in soil, an SQL of 33,000 μg/kg would be considered extremely elevated, while an SQL of 500 μg/kg would not be considered extremely elevated.

For other non-detects (i.e., those without unusually high SQLs), a value of either the SQL or one-half the SQL are assigned. If a constituent was likely to be present below the SQL, then a value of one-half the SQL is assigned to the non-detect. A value equal to the SQL is used for constituents likely to be present at concentrations close to or greater than the SQL. The decision to use the full SQL or one-half the SQL is based upon the extent and degree of contamination within each medium and potential for migration between media. As a general rule, a constituent is considered likely to be present below the SQL when the detected concentrations are two or more times below the SQL.

For the shellfish data, method detection limits (MDLs), as provided in the Phase I report (NOSC, 1991), are used in the absence of SQLs. This approach was discussed and agreed to by Mr. Robert Johnston of NOSC (NOSC, 1994). Mr. Johnston also provided an MDL of 0.29 mg/kg for arsenic as one was not included in the Phase I report.

8) TICs are constituents which are reported in the analytical data results, but for which the laboratory equipment (i.e., gas chromatography/mass spectrometry (GC/MS) instrument) was not specifically calibrated. TICs are evaluated with regard to the number reported, the estimated concentrations, and the likelihood of their presence at the site based on site history. Since the identification, presence, and concentrations of TICs are uncertain, these constituents are not included in the quantitative assessments of exposure and risk. The TIC data are discussed in Section 3.

9) An additional data evaluation factor is the Phase II data for bis(2-ethylhexyl)phthalate in ground water. As described below, the detection of this constituent in Phase II ground water samples at elevated concentrations is believed due to a modification in sampling method rather than its actual presence in ground water.

Tygon™ tubing was obtained for use in the peristaltic pumps instead of the approved silicon tubing. This was not detected until after TRC had mobilized into the field. A decision was made to proceed with ground water sampling using the Tygon™ tubing in the peristaltic pumps. Silicon tubing was ordered and the ground water sampling proceeded. The silicon tubing arrived at the end of the first week of ground water sampling and was used exclusively during the second week of ground water sampling.

Upon receipt of SVOC ground water data the following trend was noted. All ground water samples collected using the Tygon™ tubing in the peristaltic pump detected bis(2-ethylhexyl)phthalate. TRC believes that bis(2-ethylhexyl)phthalate leached from the Tygon™ tubing. The low flow ground water sampling technique used required that the outflow from the peristaltic pump be throttled down to <500 ml/minute. The low flow caused the Tygon™ tubing in the peristaltic pump to heat up. The increased heat of the tubing along with longer contact time with the ground water allowed high concentrations of bis(2-ethylhexyl)phthalate to leach into the ground water samples.

The presence of bis(2-ethylhexyl)phthalate in the ground water is attributed to sampling contamination rather than physical contamination of the aquifer. For this reason, the bis(2-ethylhexyl)phthalate data for the samples in question are excluded from the quantitative HHRA.

10) A total of seven background soil samples were collected during Phase II (see Figure 2-3). These background samples were collected in unimpacted areas located as close to Sites 02, 03, 05, 06, and 07 as possible. Identification of areas at or near each site that have not been impacted by activities at NCBC Davisville was made on the basis of historical aerial photographs. The concentrations of inorganics in the NCBC Davisville background samples are used

as a screening method to evaluate whether these constituents in on-site soils are naturally occurring or of anthropogenic origin. Constituents of anthropogenic origin (i.e., present as a result of human activities) may or may not be site-related. An inorganic is excluded from the HHRA if 95% or more of the detected concentrations fall below the maximum background concentration reported for the NCBC Davisville facility for that constituent. Table 2-1 provides the range of concentrations for each inorganic constituent at NCBC Davisville. For comparison, the ranges for background levels in eastern U.S. soils are also provided. As shown, the maximum detected background concentrations at NCBC Davisville consistently fall below those reported for eastern U.S. soils. Organic constituents present in background samples are not considered naturally occurring and are not used to evaluate the presence and concentration of organics in site samples (EPA, 1992b). Background ground water and surface water data for the NCBC Davisville facility or national/regional data are unavailable.

As indicated previously, reference shellfish samples were collected from Narragansett Bay. While the reference data are not used in the selection of COCs, these data are used in the uncertainty section to qualitatively evaluate the cancer risks and non-cancer HIs estimated for shellfish from Allen Harbor.

11) Tables providing summary statistics (i.e., frequency and range of detects) for constituents detected in surface soil, subsurface soil, ground water, surface water, and shellfish are provided in Section 3. Summary statistics for other media (e.g., sediment) are not provided since these media are not evaluated quantitatively in the HHRA.

2.1.4 Selection of Constituents of Potential Concern

A number of general factors are considered in selecting the COCs for each medium. These factors include: (i) detection frequency, (ii) comparison to available background data (inorganics in soil only), and (iii) essential nutrient status. The purpose of the selection process is to identify the site-related constituents which are likely to contribute significantly to the estimates of risk. Constituents in a medium are excluded from further consideration in the HHRA based on one or more of the following:

- The constituent was not detected, or if detected, was found at a frequency less than 5%. If fewer than 20 samples were collected for a constituent in the medium under consideration, a single detection leads to the inclusion of this constituent as a COC.

- 95% or more of the detected concentrations of inorganics fall within the range reported for the NCBC Davisville facility. Note: the ranges of facility background concentrations are consistently within those reported for eastern U.S. soils.

- The constituent is an essential nutrient (i.e., calcium, iron, magnesium, potassium, sodium).

Detailed rationale are provided in Section 3 for detected constituents which are excluded from the HHRA.

2.2 Dose-Response Assessment

This section presents information on the non-carcinogenic and carcinogenic effects associated with the identified constituents of potential concern. If available, non-cancer and cancer toxicity values from EPA's (1993a) Integrated Risk Information System (IRIS) database or EPA's (1993b) Health Effects Assessment Summary Tables (HEAST) are used. For those constituents without the above mentioned toxicity criteria, a qualitative discussion of risk is provided in Section 3. The cancer and non-cancer values used for constituents of potential concern in the HHRA are presented in Tables 2-2 to 2-7. Appendix A provides brief toxicity profiles which summarize the bases for these values.

2.2.1 Toxicity Information for Carcinogenic Effects

For potential carcinogens, risks are estimated as probabilities. The compound-specific slope factors for carcinogens (in units of $(mg/kg\text{-}d)^{-1}$) are generally estimated through the use of mathematical extrapolation models (e.g., the linearized multistage model). These models estimate the largest possible linear slope, within a 95% confidence interval, at low extrapolated doses. Thus, the slope factor is characterized as a 95% upper-bound estimate, such that the true risk is not likely to exceed the upper-bound estimate and may be lower. In addition to identifying cancer slope factors, the EPA classifies constituents with regard to their relative carcinogenicity. The classification scheme is as follows (EPA, 1992a):

Classification	Basis
Group A Human Carcinogen	Sufficient evidence of carcinogenicity in humans.
Group B1 Probable Human Carcinogen	Limited evidence in humans.
Group B2 Probable Human Carcinogen	Sufficient evidence in animals with inadequate or lack of evidence in humans.
Group C Possible Human Carcinogen	Limited evidence in animals with inadequate or lack of evidence in humans.
Group D Not classifiable as to Human Carcinogenicity	Inadequate or lack of evidence.
Group E Evidence of Non-carcino-genicity for Humans	No evidence in adequate studies.

Tables 2-2 and 2-3 summarize the available toxicity data for carcinogenic effects related to oral and inhalation exposures, respectively. For each COC, the tables contain the available cancer slope factors, EPA's weight-of-evidence classification, the type of cancer, and the source of the cancer slope factor. In the absence of inhalation slope factors, oral slope factors are cross-assigned to inhalation provided that the oral slope factors are not based on contact site tumors. For assessing the potential risks from dermal exposure to polychlorinated biphenyls

(PCBs) and tetrachlorodibenzodioxin (TCDD) (the only carcinogenic constituents for which the dermal pathway is evaluated), the available oral slope factors are used. As discussed further in Section 2.3.3, the assessment of dermal exposures to these constituents incorporates the use of relative absorption factors (RAFs) per Region I guidance (EPA, 1989b). RAFs take into account the difference in absorption between the exposure pathways and mediums of interest in the HHRA and the pathway and medium used in the laboratory study from which the toxicity values were derived. The RAFs used to assess dermal exposures to PCBs and TCDD are based on the dermal absorption values provided in EPA's (1992c) dermal exposure assessment guidance and on whether the oral toxicity values are expressed in terms of intake or absorbed dose. As indicated by Region I (EPA, 1989b), the cancer slope factor for benzo(a)pyrene is assigned to the other carcinogenic polycyclic aromatic hydrocarbons (PAHs) evaluated in the HHRA. For comparison purposes, cancer risks are also estimated using ICF-Clement's (1987) toxic equivalency factors (TEFs) for carcinogenic PAHs as follows:

Constituent	TEF
Benzo(a)pyrene	1.0
Benzo(a)anthracene	0.145
Benzo(b)fluoranthene	0.140
Benzo(k)fluoranthene	0.066
Chrysene	0.0044
Dibenzo(a,h)anthracene	1.1
Indeno(1,2,3-cd)pyrene)	0.232

These TEFs are multiplied by the oral slope factor for benzo(a)pyrene to estimate constituent-specific oral slope factors. All cross-assignments are clearly noted in Tables 2-2 and 2-3. In all cases, no more than one cross-assignment of a toxicity value (e.g., oral to inhalation, constituent to constituent) is made. Standard assumptions about breathing rate (20 m^3/d) and body weight (70 kg) are used to convert inhalation slope factors expressed in $(mg/m^3)^{-1}$ to units of dose (i.e., $(mg/kg\text{-}d)^{-1}$).

For assessing potential risks associated with exposures to dioxins/furans, EPA's (1989d) TEFs are used and include:

Constituent		TEF
Mono-, Di-, and Tri- CDDs:		0
TCDDs:	2,3,7,8-	1
	Other	0
PeCDDs:	2,3,7,8-	0.5
	Other	0
HxCDDs:	2,3,7,8-	0.1
	Other	0
HpCDDs:	2,3,7,8-	0.01
	Other	0
OCDD:		0.001
Mono-, Di-, and Tri- CDFs:		0
TCDFs:	2,3,7,8-	0.1
	Other	0
PeCDFs:	1,2,3,7,8-	0.05
	2,3,4,7,8-	0.5
	Other	0
HxCDFs:	2,3,7,8-	0.1
	Other	0
HpCDFs:	2,3,7,8-	0.01
	Other	0
OCDF:		0.001

In this HHRA, these TEFs are incorporated into the exposure assessment such that the EPCs for dioxins/furans are expressed in terms of 2,3,7,8-TCDD toxic equivalents. That is, the TEFs are multiplied by the congener-specific concentration data and the resulting products summed. The EPCs for 2,3,7,8-TCDD toxic equivalents are then combined with the slope factors for 2,3,7,8-TCDD to estimate the potential risks associated with exposures to dioxins/furans at the site.

2.2.2 Toxicity Information for Non-Carcinogenic Effects

The evaluation of risk from exposure to non-carcinogens is based on the use of RfDs. RfDs have units of mg/kg-d, and are estimates of daily exposure to the population (including sensitive subpopulations) that are likely to be without appreciable risk of deleterious effects for the defined exposure period (subchronic or chronic). The RfD is calculated by dividing the no adverse effect level (NOAEL) or lowest observed adverse effect level (LOAEL) derived from animal or human studies by an uncertainty factor, which is multiplied by a modifying factor. RfDs incorporate uncertainty factors which serve as a conservative downward adjustment of the numerical value and reflect scientific judgment regarding the data used to estimate the RfD. For example, a factor of 10 is used to account for variations in human sensitivity (i.e., to protect sensitive subpopulations) when the data stems from human studies involving average, healthy subjects. An additional factor of 10 may also be used for each of the following:

- extrapolation from chronic animal studies to humans,
- extrapolation from a LOAEL to a NOAEL, and
- extrapolation from subchronic to chronic studies.

Finally, based on the level of certainty of the study and database, an additional modifying factor (between zero and ten) may be used. In establishing an RfD, the EPA assigns it a level of confidence: low, medium, or high.

The toxicity data for non-carcinogenic effects associated with oral and inhalation exposures are summarized in Tables 2-4 through 2-7. Included in these tables are the available RfDs, EPA's confidence level in the RfD, the critical effect, the source of the RfD, and the uncertainty and modifying factors used in setting the RfD. In the absence of inhalation RfDs for a constituent, the oral RfDs are cross-assigned to inhalation provided that the effects from oral exposure were systemic (i.e., not evident at the point of contact). For evaluating the potential non-cancer risks from dermal exposures to cadmium (the only non-carcinogenic constituent for which the dermal pathway is evaluated), the available oral RfDs are used. As discussed further in Section 2.3.3, the assessment of dermal exposures to cadmium incorporates the use of a RAF per EPA Region I guidance (EPA, 1989b). RAFs take into account the difference in absorption between the exposure pathways and mediums of interest in the HHRA and the pathway and medium used in the laboratory study from which the toxicity values were derived. The RAF used to assess dermal exposures to cadmium is based on the dermal absorption value provided in EPA's dermal exposure assessment guidance (EPA, 1992c) and on whether the oral toxicity values are expressed in terms of intake or absorbed dose. For Scenario 1 (future construction), subchronic RfDs (if available) are used to estimate risks since the exposure duration is considered subchronic (i.e., <7 years). In the absence of subchronic RfDs, chronic RfDs are used as available. In addition, non-cancer toxicity values may be cross-assigned from one constituent to another. An example is the use of the oral RfDs for gamma-

BHC for alpha- and beta-BHC. All cross-assignments are clearly noted in Tables 2-4 through 2-7. In all cases, no more than one cross-assignment of a toxicity value (e.g., oral to inhalation, chronic to subchronic, constituent to constituent) is made. Standard assumptions about breathing rate (20 m^3/d) and body weight (70 kg) are used to convert reference concentrations (RfCs) expressed in mg/m^3 to units of dose (i.e., mg/kg-d).

2.2.3 Constituents for Which EPA Has Not Developed Toxicity Criteria

Constituents for which EPA (1993a, 1993b) has not developed toxicity values are excluded from the quantitative risk characterization. The Site 09 COCs for which EPA toxicity values are unavailable are identified in Section 3. With the exception of lead, a qualitative risk evaluation for these constituents is also provided in Section 3. For lead, the following approach is used in the absence of EPA toxicity values.

Lead

EPA (1993a,b) toxicity values have not been established for lead. For the purpose of evaluating lead-related risks at NCBC Davisville sites, an alternative approach is considered. Potential risks from lead exposure at a site are assessed using the "Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites" which proposes an interim soil cleanup level for total lead at 500 to 1,000 mg/kg (OSWER Directive #9355.4-02; September 7, 1989) (i.e., EPA, 1989c). It should be emphasized that this guidance document suggests levels that are considered protective for direct contact at residential settings. This guidance is not considered to be used as a regulation. In the absence of other EPA toxicity values, the guidance is used to evaluate soil lead levels at NCBC Davisville sites, even though the Comprehensive Reuse Plan, Davisville NCBC, Development Reuse Scenarios (September 1993) (see Appendix B of this report) indicates that no residential areas are included in the land reuse plan. This guidance has been interpreted to mean that any on-site surface soil or subsurface soil samples with a detected lead concentration within or below the 500 to 1,000 mg/kg range would be acceptable regarding potential impacts to human health. The concentrations of lead in on-site soil are also compared to the Rhode Island Department of Environmental Management (RIDEM) guidance level for lead in soil of 300 mg/kg.

2.3 Exposure Assessment

An exposure assessment i) identifies the exposure scenarios and pathways of interest, ii) calculates the exposure point concentrations used in quantifying constituent exposures, and iii) estimates the constituent-specific exposure doses for each pathway and scenario.

2.3.1 Selection of Exposure Scenarios and Pathways

The most critical aspect of a technically sound exposure assessment is the identification of exposure routes, together with the identification of human receptors. Site-specific discussions of current and potential future receptors and land uses at Site 09 are provided in Section 3. Exposure scenarios and pathways were chosen based on the Comprehensive Reuse Plan, Davisville NCBC, Development Reuse Scenarios (September 1993) provided in Appendix B.

As discussed in the plan, Allen Harbor is slated for recreation/conservation or government support use. Residential development is not included in the land reuse plan for this area at NCBC Davisville, and is therefore excluded from further consideration in the Phase II HHRA.

Although not explicitly specified in the land reuse plan, another land use considered for the Phase II HHRA for each NCBC Davisville site includes future construction activities. Each of the proposed scenarios (i.e., construction, recreation, shellfishing) are selected for inclusion in the Phase II HHRA and described below.

Scenario 1 (Future Construction)

This scenario considers future exposures of on-site construction workers. Construction workers may be exposed to site constituents during future construction of commercial buildings or recreational facilities at an NCBC Davisville site. This scenario is also intended to address potential outdoor worker exposures from other activities (e.g., utility work). Exposures to construction workers are assumed to occur through incidental ingestion of and dermal contact with subsurface soil, and through the inhalation of suspended subsurface soil particulates and inhalation of volatiles (from subsurface soil). This scenario was evaluated in the Phase I HHRA for all sites.

Scenario 2 (Future Recreation)

This scenario evaluates exposure to children and youths (2 to 18 years) using this site assuming it has been developed into a recreational area. Exposures to area residents who visit the site are assumed to occur through incidental ingestion of and dermal contact with surface soil; dermal contact with ground water and inhalation of volatiles (from ground water) during showering; and incidental ingestion of and dermal contact with surface water while swimming. Although the Phase I HHRA considered exposures to trespassers, it did not evaluate a recreational scenario.

Scenario 3 (Future Shellfishing)

Exposures of off-site adult residents through the ingestion of shellfish (i.e., clams, mussels, and oysters) are considered in this scenario. This exposure scenario was not evaluated in the Phase I HHRA.

Each scenario includes a particular potential "receptor population" and a consideration of the pathways by which those receptors may encounter COCs. The selected exposure pathways for each scenario are not intended to encompass all possible routes of exposure but rather to focus on those which are likely to contribute the greatest exposure for each identified receptor. Differences in exposure parameter assumptions between the Phase I and Phase II HHRAs are discussed in Section 2.3.3.

The evaluation of dermal contact with soil is limited to evaluating the potential risks from exposures to cadmium, PCBs, and TCDD. The EPA has reviewed the experimental data on nine chemicals for which percutaneous absorption from a soil matrix has been studied. However, because of differences between experimental conditions and exposure scenarios, the EPA has identified the percentage of applied dose absorbed for only three of the nine chemicals: cadmium, tetrachlorobiphenyl (TCB), and TCDD. The recommended percentages of absorption for an applied dose are 0.1 to 1%, 0.6 to 6%, and 0.1 to 3%, respectively (EPA, 1992c). In this HHRA, the higher, more conservative value for each constituent is used and the TCB value has been assigned to PCBs. This approach to the assessment of the dermal exposure pathway follows EPA Region I guidance. Use of these dermal absorption factors in estimating exposure doses is discussed in Section 2.3.3. Permeability constants (K_p) are used to estimate the dose absorbed by dermal contact with surface water while swimming and ground water while showering, and are discussed further in Section 2.3.3.

2.3.2 Estimation of Exposure Point Concentrations

As specified in the Region I Supplemental Risk Assessment Guidance (EPA, 1989b), two types of exposure point concentrations (EPCs) are identified for each COC in each medium: the mean and the maximum detected concentration.

For the purposes of the HHRA, the geometric mean, rather than the arithmetic mean, is used as the indicator of the central tendency of the site data. The use of the geometric mean, over the arithmetic mean, as one of the EPCs is consistent with current EPA guidance (1992e, Supplemental Guidance to RAGs: Calculating the Concentration Term) which states that in most cases it is reasonable to assume environmental sampling data are lognormal. The geometric mean may be calculated as follows:

$$Yij_{bar} = 10 \wedge \frac{\log(Xi_1 \times Xi_2 \times \ldots Xi_n)}{n}$$

where:

Yij_{bar}	=	geometric mean of all sample concentrations of constituent i in medium j
Xi	=	the concentration for constituent i in each of n samples
n	=	the number of samples

The maximum detected concentration is also used to assess potential exposures and risks. Exposure estimates based on maximum concentrations are referred to estimates of reasonable maximum exposure (RME) per EPA Region I guidance. Collectively, these two EPCs allow for average and upper-bound estimates of health risk. The site-specific data used to determine the geometric means and maximum concentrations of constituents in soil, ground water, surface water, and shellfish are provided in Appendix C.

The EPCs for constituents adsorbed to suspended particulates (expressed in milligrams of particulate-adsorbed constituent per cubic meter of air; mg/m^3) are calculated using an EPA (1988a) fugitive dust model. The fugitive dust concentration is combined with the constituent concentrations in soil to estimate the concentrations of the particulate-adsorbed constituents in air. This approach conservatively assumes that the concentration of constituents in the dust (mg/kg) is equal to the concentration of these constituents in soil (mg/kg). This approach also conservatively assumes that VOCs remain sorbed to dust (i.e., it does not consider the losses of airborne VOCs through volatilization and washout in precipitation).

The fugitive dust concentration is calculated as:

$$TSP = \frac{E_{tot}}{w \times W \times H} \times CF$$

where:

TSP	=	fugitive dust concentration (site-specific; kg/m^3)
E_{tot}	=	emission rate for wind erosion and loading/dumping activities combined (site-specific; kg/day)
w	=	wind speed (4.74 m/s)
W	=	width of site (site-specific; m)
H	=	height of breathing zone (2 m)
CF	=	conversion factor (1.16E-05 day/s)

Wind erosion of soil and loading/dumping activities during construction are assumed to comprise the total soil emissions. The contribution to the total fugitive dust emission rate from wind erosion of exposed soil is calculated as:

$$E_w = a \times I \times K \times C \times L \times V \times A \times CF_1 \times CF_2$$

where:

E_w	=	emission rate due to wind erosion (site-specific; kg/d)
a	=	fraction of soil particulates eroded and entrained by wind that remain suspended (0.01)
I	=	soil erodibility (134 tons acre^{-1} yr^{-1})
K	=	soil roughness factor (1.0; assumes worst-case of flat terrain)
C	=	climatic factor (0.04; based on values for the Northeast region)
L	=	field length factor (0.7; based on small reclamation)
V	=	vegetative cover factor (1.0; assumes worst-case of no vegetative cover)
A	=	area of site (site-specific; acre)
CF_1	=	conversion factor (2.74E-03 yr/day)
CF_2	=	conversion factor (907 kg/ton)

Most of these values are specified in EPA (1988a) for worst-case situations. The climatic factor ("C") is read from a map and multiplied by 0.01 as specified. The variables "a" and "I" are determined based on site soil characteristics.

The contribution to the total fugitive dust emission rate from loading/dumping activities at a site (e.g., during construction) is calculated as:

$$E_{c/d} = \frac{V \times D \times EF}{T}$$

where:

$E_{c/d}$	=	emission rate due to loading/dumping (site-specific; kg/d)
V	=	volume of soil excavated (site-specific; m^3)
D	=	density of soil (1.5 Mg/m^3)
EF	=	emission factor (kg/Mg)
T	=	duration of excavation (30 days)

In estimating the volume excavated, it is assumed that a building 20 feet by 30 feet in area with a 10 foot basement/foundation is constructed per acre half acre of land (i.e., that 340 m^3 of soil is excavated per acre). Thus, the area excavated per site is approximated by multiplying the site area (acre) by 340 m^3/acre.

The emission factor used to calculate the emission rate for loading and dumping is estimated as:

$$EF = \frac{k \times (KC) \times (U/UC)^{1.3}}{(M/MC)^{1.4}}$$

where:

EF	=	emission factor (kg/Mg)
k	=	particle size multiplier (0.74)
U	=	mean wind speed (4.74 m/s)
M	=	soil moisture (5%)

KC	=	particle size constant (0.0016)
UC	=	wind speed constant (2.2)
MC	=	moisture content constant (2)

The EPCs for volatilized constituents (from subsurface soil) in ambient air during construction activities are calculated using EPA's (1991b) Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals) and EPA's (1992g) Air/Superfund National Technical Guidance Study Series. The models and site-specific parameters are described below.

By assuming complete equilibrium is established between constituents in the soil gas and the soil, it is possible to estimate the soil gas concentration due to soil by:

$$SG_{soil} = \frac{Conc_{soil} \bullet UC1 \bullet UC2 \bullet H'}{K_{oc} \bullet f_{oc}}$$

where:

SG_{soil}	=	Chemical concentration in vapor phase (g/cm^3)
$Conc_{soil}$	=	Concentration in soil (mg/kg)
UC1	=	Unit conversion for soil density (1.7E-03 kg/cm^3)
UC2	=	Unit conversion (1E-03 g/mg)
H'	=	Henry's law constant (dimensionless)
K_{oc}	=	Organic carbon content in soil to water partition coefficient (chemical-specific)
f_{oc}	=	Fraction of organic carbon in soil

For the purpose of this evaluation, a default value of 0.02 is assumed for f_{oc} (EPA, 1991b).

The flux rate of constituents from soil is assumed to be the result of a Fickian-based diffusion of the vapor through the soil matrix such that once in the vapor phase the constituent diffuses through the soil at a rate dependent on the soil porosity, pore space geometry and the constituent's air diffusion coefficient.

The steady-state constituent flux is calculated using:

$$J = \frac{D_T^{eff} \bullet SG \bullet UC1 \bullet UC2}{r}$$

where:

J	=	Flux ($g/s \bullet cm^2$)
D_T^{eff}	=	Overall effective porous media diffusion coefficient (cm^2/s)
SG	=	Measured soil gas concentration (mg/cm^3)
UC1	=	Unit conversion (1E-03 g/mg)
UC2	=	Unit conversion (1E-06 m^3/cm^3)
r	=	Radius of zone of influence (cm)

The radius of the zone of influence for soil is assumed to be equal to the distance from the soil surface to the ground water source (i.e., 12 feet or 363 cm). These assumptions are based on EPA (1991b) guidance which indicates that soil concentrations are homogeneous from the soil surface to the depth of concern and the depth of concern is defined as the depth at which a near impenetrable layer occurs or the permanent ground water level is reached. [Note: The average depth to ground water at the site is 12 feet below grade.]

The effective diffusion coefficient (D_T^{eff}) is calculated from:

$$D_T^{eff} = \frac{D_A \bullet P_a^{10/3}}{P_T^2}$$

where:

D_T^{eff}	=	Overall effective porous media diffusion coefficient based on vapor phase concentration for the region between the source and the foundation or the soil surface (cm^2/s)
D_A	=	Vapor diffusion coefficient in air (cm^2/s)(constituent-specific)
P_a	=	Air filled porosity of soil (unitless) = $P_T - \Theta m\ P_b$

where:

P_T	=	Total soil porosity (unitless)
Θm	=	Moisture content (cm^3 of H_2O/g of soil)

P_b = Bulk density of soil (g/cm^3)

For this evaluation the following assumptions are made based on EPA (1993e): $P_T = 0.43$, $\Theta m = 0.1$ and $P_b = 1.5$.

An estimation of the ambient air concentrations is made using the following equation based on EPA (1991b) guidance:

$$C_{ambient} = \frac{J \bullet A \bullet UC1 \bullet UC2}{L \bullet DH \bullet WS}$$

where:

$C_{ambient}$	=	Ambient air concentration (mg/m^3)
J	=	Estimated flux (constituent-specific; $g/s \bullet cm^2$)
A	=	Area of site (cm^2)
UC1	=	Unit conversion (1E+03 mg/g)
UC2	=	Unit conversion (1E+06 cm^3/m^3)
L	=	Effective length of site (cm)
DH	=	Diffusion height (cm)
WS	=	Wind speed in mixing zone (cm/s)

For the purpose of this evaluation the values for A and L are estimated at 6.1E+08 cm^2 and 2.5E+04 cm, respectively, based on the site area of 15 acres. A value of 200 cm is assumed as a default value for DH (EPA, 1991b). A wind speed of 474 cm/s is used as a default value.

The EPCs for volatilized constituents from ground water to air while showering are calculated based on the Ideal Gas Law as follows:

$$\text{Air Concentration (CA)} = \frac{CW \times H' \times MW \times P \times UC1}{R \times T \times UC2}$$

where:

CA	=	Constituent Concentration in Air (constituent-specific; mg/m^3)
CW	=	Ground Water Concentration (constituent-specific; mg/l)
H'	=	Dimensionless Henry's Law Constant (constituent-specific; --)
MW	=	Molecular Weight (constituent-specific; g/mol)
P	=	Atmospheric Pressure (1 atm)

UC1	=	Unit Conversion (1E+03 mg/g)
R	=	Ideal Gas Constant (8.2E-05 atm * m^3/mol * K)
T	=	Temperature While Showering (310°K)

and

H'	=	H/(R x T)
H	=	Henry's Law Constant (constituent-specific; atm * m^3/mol)

Tables summarizing media-specific EPCs are provided in Section 3. The constituent-specific model inputs are provided along with the exposure and risk estimates in Appendix D.

2.3.3 Estimation of Constituent Exposure Doses

The estimated constituent exposure doses (mean and RME) for each pathway and scenario are presented along with the risk estimates in Section 3. A discussion of the site-specific risk estimates is also provided in Section 3. The equations and input parameters used to estimate these exposure doses are provided below by scenario. The input parameters are also summarized and compared with Phase I values in Table 2-8. The exposure doses are calculated following Region I (EPA, 1989b) guidance and are expressed in milligrams constituent per kilogram body weight per day (mg/kg-d).

The generic equation for calculating constituent exposure dose is:

$$\text{Exposure Dose} = \frac{\text{Conc x ConRate x RAF x ExpFreq x ExpDur}}{\text{BW x AT}}$$

where:

Conc	=	exposure point concentration (either the geometric mean or the maximum detected concentration) (mg/kg for soil, mg/l for water)
ConRate	=	amount of contaminated medium contacted per unit time or event (mg/d for soil, l/d for water)
RAF	=	relative absorption factor (--)

ExpFreq	=	frequency of exposure (hr/d, d/yr)
ExpDur	=	duration of exposure (yr)
BW	=	body weight (kg)
AT	=	time period over which the exposure is averaged (25550 d for cancer; ExpDur x 365 d/yr for non-cancer)

The RAFs take into account the difference in absorption between the exposure pathways and mediums of interest in the HHRA and the pathway and medium used in the laboratory study from which the toxicity values were derived. The ingestion and inhalation RAF values used in the Phase II HHRA correspond to those recommended as defaults by Region I (EPA, 1989b). The RAFs used to assess dermal exposures (i.e., to cadmium, PCBs, and TCDD) are based on the dermal absorption values provided in EPA's (1992c) dermal exposure assessment guidance and on whether the oral toxicity values are expressed in terms of intake or absorbed dose. The dermal absorption value for cadmium of 0.01 is used as the dermal RAF since the oral RfDs for this constituent take into account absorption following the ingestion of food and water (see EPA, 1993a). Although the oral slope factor for PCBs is intake-based, the dermal absorption value for this constituent (0.06) is also used as the dermal RAF since the oral absorption of PCBs is nearly 100% (ATSDR, 1987). For TCDD, the dermal absorption value of 0.03 is divided by the oral absorption value of 0.75 (as provided in EPA, 1993b) to estimate a dermal RAF of 0.04.

The permeability constants designated as Kp and expressed in centimeters per hour (cm/hr) provide an indication of the rate at which a constituent in water moves across the skin into the bloodstream. The Kp values used in the HHRA correspond to those recommended by EPA (1992c). That is, experimentally measured Kp values in Table 5-3 of EPA (1992c) or a default of 1E-03 cm/hr are used for inorganic COCs. For organic COCs, predicted Kp values provided in Table 5-7 of EPA (1992c) or as calculated per EPA (1992c) guidance based on constituent-specific octanol-water partition coefficients (Kow) and molecular weights are used.

The constituent dose for each receptor in each of the scenarios is based on numerous parameters with varying degrees of uncertainty. The exposure parameters used in calculating the constituent doses and the rationale for selecting them are summarized in Table 2-8. As indicated, this table also provides a comparison of the input parameters for the Phase I and Phase II HHRAs.

The equations, key exposure parameters and assumptions for each scenario are described below. A summary of the constituent-specific chemical, physical, and environmental fate parameters used in estimating exposure intakes and doses is provided in Table 2-9.

Scenario 1 (Future Construction)

This scenario considers a future worker involved in on-site construction, excavation, or utility work. Workers are assumed exposed for 250 days over a one-year period. Similar to the Phase I HHRA (TRC-ECI, 1991b), worker exposure to site constituents is assumed to occur through incidental ingestion of and dermal contact with subsurface soils (2 to 10 feet). The Phase II construction scenario also evaluates worker exposure through inhalation of suspended subsurface soil particulates and inhalation of volatiles from subsurface soils. Additional changes in exposure assumptions have also been made in the Phase II construction scenario. As shown in Table 2-8, the exposure frequency has been changed from 10 to 250 d/yr, the exposure duration from 30 to 1 year, the soil ingestion rate from 100 to 480 mg/d (EPA, 1991a), and the dermal contact rate from 500 to 1,000 mg/d (EPA, 1989b). The lower dermal contact rate of 500 mg/d (based on a SA of 2,000 cm^2) is recommended for normal residential or recreational activities, while the higher rate of 1,000 mg/d (based on a SA of 4,000 cm^2) is more appropriate for activities potentially resulting in higher exposures.

The equations used to estimate exposures under this scenario are as follows:

Ingestion of Constituents in Soil

$$\text{Exposure Dose (mg/kg-d)} = \frac{CS \times UC \times IR \times RAF \times EF \times ED}{BW \times AT}$$

where:

CS	=	Constituent Concentration in Soil at Depths of 2 to 10 Feet (constituent-specific; mg/kg)	
UC	=	Unit Conversion (10^{-6} kg/mg)	
IR	=	Ingestion Rate (480 mg/d)	
RAF	=	Relative Absorption Factor (unitless):	
		Volatile Organic Compounds:	1.0
		Semivolatile Organic Compounds:	
		PAHs	1.0
		PCBs:	0.3
		Pesticides:	
		High soil sorption (DDT)	0.3
		Low soil sorption	1.0
		Inorganics:	
		Lead (Adults)	0.3
		All Others	1.0
EF	=	Exposure Frequency (250 d/yr)	
ED	=	Exposure Duration (1 yr)	
BW	=	Body Weight (70 kg)	
AT	=	Averaging Time - period over which exposure is averaged (d): 365 d for non-cancer risks; 25,550 d for cancer risks	

Dermal Contact with Constituents in Soil

$$\text{Exposure Dose (mg/kg-d)} = \frac{CS \times UC \times CR \times RAF \times EF \times ED}{BW \times AT}$$

where:

CS	=	Constituent Concentration in Soil at Depths of 2 to 10 Feet (constituent-specific; mg/kg)	
UC	=	Unit Conversion (10^{-6} kg/mg)	
CR	=	Skin Contact Rate (1,000 mg/d)	
RAF	=	Relative Absorption Factor (unitless):	
		Cadmium	0.01
		PCBs	0.06
		TCDD	0.04
EF	=	Exposure Frequency (250 d/yr)	
ED	=	Exposure Duration (1 yr)	
BW	=	Body Weight (70 kg)	

AT	=	Averaging Time - period over which exposure is averaged (d): 365 d for non-cancer risks 25,550 d for cancer risks

Inhalation of Airborne Constituents Absorbed to Dust

$$\text{Exposure Dose (mg/kg-d)} = \frac{CS \times TSP \times IR \times RAF \times ET \times EF \times ED}{BW \times AT}$$

where:

CS	=	Constituent Concentration in Soil at Depths of 2 to 10 Feet (constituent-specific; mg/kg)
TSP	=	Ambient Dust Concentration (site-specific; kg/m^3)
IR	=	Inhalation Rate (2.5 m^3/hr for adults under moderate exertion)
RAF	=	Relative Absorption Factor (unitless; 1.0 for all constituents)
ET	=	Exposure Time (8 hr/d)
EF	=	Exposure Frequency (250 d/yr)
ED	=	Exposure Duration (1 yr)
BW	=	Body Weight (70 kg)
AT	=	Averaging Time - period over which exposure is averaged (d): 365 d for non-cancer risks 25,550 d for cancer risks

Inhalation of Volatilized Constituents in Air

$$\text{Exposure Dose (mg/kg-d)} = \frac{CA \times IR \times RAF \times ET \times EF \times ED}{BW \times AT}$$

where:

CA	=	Constituent Concentration in Air (constituent-specific; mg/m^3)
IR	=	Inhalation Rate (2.5 m^3/hr for adults under moderate exertion)
RAF	=	Relative Absorption Factor (1.0 for all constituents; unitless)
ET	=	Exposure Time (8 hr/d)
EF	=	Exposure Frequency (250 d/yr)
ED	=	Exposure Duration (1 yr)
BW	=	Averaging Time - period over which exposure is averaged (d): 365 d for non-cancer risks 25,550 d for cancer risks

Scenario 2 (Future Recreation)

For this scenario, local children and youths aged 2 to 18 years are assumed to visit the site two days per week during the spring, summer, and fall for a total of 72 days per year. The children and youths are assumed to visit the site every year for an exposure duration of 16 years. Exposure to site constituents is assumed to occur through the incidental ingestion of and dermal contact with surface soil (0 to 2 feet); dermal contact with ground water and inhalation of volatiles while showering; and incidental ingestion of and dermal contact with surface water while swimming. As indicated in Table 2-8, exposures under a future recreational scenario were not evaluated in the Phase I HHRA.

The equations used to estimate exposures under this scenario are as follows:

Ingestion of Constituents in Soil

$$\text{Exposure Dose (mg/kg-d)} = \frac{CS \times UC \times IR \times RAF \times EF \times ED}{BW \times AT}$$

where:

CS	=	Constituent Concentration in Soil at Depths of 0 to 2 Feet (constituent-specific; mg/kg)
UC	=	Unit Conversion (10^{-6} kg/mg)
IR	=	Ingestion Rate (125 mg/d; assumes 200 mg/d for 2-6 yrs and 100 mg/d for 6-18 yrs)
RAF	=	Relative Absorption Factor (unitless):

Volatile Organic Compounds:	1.0
Semivolatile Organic Compounds:	
PAHs	1.0
PCBs:	0.3
Pesticides:	
High soil sorption (DDT)	0.3
Low soil sorption	1.0
Inorganics:	
Lead (Adults)	0.3
Lead (Children 2-6 yr old)	0.5
All Others	1.0

EF	=	Exposure Frequency (72 d/yr; based upon visiting the site 2 d/wk during spring, summer and fall)
ED	=	Exposure Duration (16 yr)
BW	=	Body Weight (33.9 kg; children/youths 2-18 yr old)
AT	=	Averaging Time - period over which exposure is averaged (d): 5,840 d for non-cancer risks 25,550 d for cancer risks

Dermal Contact with Constituents in Soil

$$\text{Exposure Dose (mg/kg-d)} = \frac{CS \times UC \times CR \times RAF \times EF \times ED}{BW \times AT}$$

where:

CS	=	Constituent Concentration in Soil at Depths of 0 to 2 feet (constituent-specific; mg/kg)
UC	=	Unit Conversion (10^{-6} kg/mg)
CR	=	Skin Contact Rate (355 mg/d; i.e., 0.5 mg/cm^2 x 1,420 cm^2 x 0.5)
RAF	=	Relative Absorption Factor (unitless): Cadmium 0.01 PCBs 0.06 TCDD 0.04
EF	=	Exposure Frequency (72 d/yr)
ED	=	Exposure Duration (16 yr)
BW	=	Body Weight (33.9 kg; children/youths 2-18 yr old)
AT	=	Averaging Time - period over which exposure is averaged (d): 5,840 d for non-cancer risks 25,550 d for cancer risks

Dermal Contact with Constituents in Ground Water (While Showering)

$$\text{Exposure Dose (mg/kg-d)} = \frac{CW \times UC \times SA \times Kp_{adj} \times ET \times EF \times ED}{BW \times AT}$$

where:

CW	=	Constituent Concentration in Ground Water (constituent-specific; mg/l)
UC	=	Unit Conversion (1E-03 l/ml)
SA	=	Skin Surface Area Available for Contact (12,000 cm^2)
Kp_{adj}	=	Dermal Permeability Constant (constituent-specific; cm/hr)
ET	=	Exposure Time (0.16 hr/d)
EF	=	Exposure Frequency (20 d/yr)
ED	=	Exposure Duration (16 yr)
BW	=	Body Weight (33.9 kg; children/youths 2-18 yr old)
AT	=	Averaging Time - period over which exposure is averaged (d): 5,840 d for non-cancer risks 25,550 d for cancer risks

Inhalation of Volatilized Constituents in Ground Water (While Showering)

$$\text{Exposure Dose (mg/kg-d)} = \frac{CA \times IR \times RAF \times ET \times EF \times ED}{BW \times AT}$$

where:

CA	=	Constituent Concentration in Air (constituent-specific; mg/m^3)
IR	=	Inhalation Rate (2.5 m^3/hr)
RAF	=	Relative Absorption Factor (unitless; 1.0 for all constituents)
ET	=	Exposure Time (0.16 hr/d)
EF	=	Exposure Frequency (20 d/yr)
ED	=	Exposure Duration (16 yr)
BW	=	Body Weight (33.9 kg; children/youths 2-18 yr old)
AT	=	Averaging Time - period over which exposure is averaged (d): 5,840 d for non-cancer risks 25,550 d for cancer risks

Ingestion of Constituents in Surface Water (While Swimming)

$$\text{Exposure Dose (mg/kg-d)} = \frac{CW \times UC \times IR \times RAF \times ET \times EF \times ED}{BW \times AT}$$

where:

CW	=	Constituent Concentration in Water (constituent-specific; mg/l)
UC	=	Unit Conversion (1E-03 l/ml)
IR	=	Ingestion Rate (50 ml/hr)
RAF	=	Relative Absorption Factor (unitless; 1.0 for all constituents)
ET	=	Exposure Time (0.5 hr/d)
EF	=	Exposure Frequency (20 d/yr)
ED	=	Exposure Duration (16 yr)
BW	=	Body Weight (33.9 kg; children/youths 2-18 yr old)
AT	=	Averaging Time - period over which exposure is averaged (d): 5,840 d for non-cancer risks 25,550 d for cancer risks

Dermal Contact with Constituents in Surface Water (While Swimming)

$$\text{Exposure Dose (mg/kg-d)} = \frac{CW \times UC \times SA \times Kp_{adj} \times ET \times EF \times ED}{BW \times AT}$$

where:

CW	=	Constituent Concentration in Surface Water (constituent-specific; mg/l)
UC	=	Unit Conversion (1E-03 l/ml)
SA	=	Skin Surface Area Available for Contact (12,000 cm^2)
Kp_{adj}	=	Dermal Permeability Constant (constituent-specific; cm/hr)
ET	=	Exposure Time (0.5 hr/d)
EF	=	Exposure Frequency (20 d/yr)
ED	=	Exposure Duration (16 yr)
BW	=	Body Weight (33.9 kg; children/youths 2-18 yr old)
AT	=	Averaging Time - period over which exposure is averaged (d): 5,840 d for non-cancer risks 25,550 d for cancer risks

Scenario 3 (Future Shellfishing)

Exposures of off-site adult residents through the ingestion of shellfish (i.e., clams, mussels, and oysters) are considered in this scenario. This exposure scenario was not evaluated in the Phase I HHRA.

The equation used to estimate exposures under this scenario is as follows:

Ingestion of Shellfish

$$\text{Exposure Dose (mg/kg-d)} = \frac{CT \times UC \times IR \times FI \times RAF \times EF \times ED}{BW \times AT}$$

where:

CT	=	Constituent Concentration in Shellfish Tissue (constituent-specific; mg/kg)	
UC	=	Unit Conversion (10^{-6} kg/mg)	
IR	=	Ingestion Rate (1,200 mg/d)[a]	
FI	=	Fraction Ingested from Allen Harbor (1; unitless)	
RAF	=	Relative Absorption Factor (unitless):	
		Volatile Organic Compounds:	1.0
		Semivolatile Organic Compounds:	
		PAHs	1.0
		PCBs:	0.3
		Pesticides:	
		High soil sorption (DDT)	0.3
		Low soil sorption	1.0

		Inorganics:	
		Lead (Youths/Adults)	0.3
		All Others	1.0
EF	=	Exposure Frequency (350 d/yr)	
ED	=	Exposure Duration (30 yr)	
BW	=	Body Weight (70 kg)	
AT	=	Averaging Time - period over which exposure is averaged (d): 10,950 d for non-cancer risks; 25,550 d for cancer risks	

[a] As a comparison, shellfish ingestion rates provided in EPA's Exposure Factors Handbook (1990a) are also used. The alternative ingestion rates for clams and oysters are 442 and 291 mg/d, respectively. In the absence of an ingestion rate for mussels in EPA (1990a), the value reported (13 mg/d) for other shellfish is used as the alternative.

2.4 Risk Characterization

2.4.1 Quantitative Risk Assessment

The results of the quantitative risk analysis are presented in two forms. In the case of human health effects associated with exposure to potential carcinogens, risk estimates are expressed as the lifetime probability of additional cancer risk associated with the given exposure. The cancer risk estimates are calculated as the cancer-based exposure dose (mg/kg-d) times the slope factor ($(mg/kg\text{-}d)^{-1}$). In numerical terms, these risk estimates are presented in scientific notation in this report. Thus, a lifetime risk of 1E-04 means a lifetime incremental risk of one in ten thousand; a lifetime risk of 1E-06 means an incremental lifetime risk of one in one million and so on.

For determining whether non-cancer health effects may be a concern, constituent-specific HQs are used. The HQ is calculated as the non-cancer exposure dose (mg/kg-d) divided by the RfD (mg/kg-d). Subchronic RfDs are used to estimate risks for scenarios involving short-term exposures (i.e., construction), while chronic RfDs are used for those scenarios involving long-term exposures (i.e., recreational, shellfishing). The HQs are summed across constituents to calculate a hazard index (HI) for each pathway in each scenario.

Cancer risks and non-cancer HQs/HIs are discussed for Scenario 1 (future construction), Scenario 2 (future recreation), and Scenario 3 (future shellfishing). The estimated cancer risks and non-cancer HIs may be compared to available regulatory guidelines. Under Superfund (EPA, 1990b), a cancer risk range of 1E-06 to 1E-04 is generally acceptable, while risks above 1E-04 typically imply a need for remediation. A cancer risk of 1E-06 is considered the point of departure for determining risk-based remediation goals. Regarding non-carcinogenic health hazards. EPA (1989a) states that:

> "When the total hazard index for an exposed individual or group of individuals exceeds unity, there may be concern for potential non-cancer health effects."

Thus, the cancer risk and HIs that may constitute a concern are those greater than 1E-06 and greater than 1E+00, respectively.

Cancer risks and non-cancer HIs are discussed in Section 3 for each scenario and pathway evaluated. These risk levels are presented as a range in which both the average value (based on the geometric mean concentrations) and the RME value (based on the maximum concentrations detected on-site) are provided. In certain cases, the mean risk estimate exceeds the RME due to the inclusion of SQLs in determining the geometric mean concentrations. For a number of constituents (e.g., pesticides in soil), the concentrations detected fall below the values assigned to non-detects (i.e., one-half the SQLs) such that the geometric mean exceeds the maximum detected value. Given the uncertainty associated with characterizing constituent concentrations in samples reported as non-detected, the uncertainty in the mean risk estimates likely exceeds that related to the estimates of RME risk. For COCs without EPA toxicity values, a qualitative and site-specific assessment of risk is provided.

3.0 SITE 09 - ALLEN HARBOR LANDFILL

This section of the report provides the HHRA for Site 09 - Allen Harbor Landfill. The HHRA for Site 09 was conducted using the general methodology outlined in Section 2. Site-specific information regarding certain aspects of the methodology (i.e., hazard identification and exposure assessment), the results of the risk characterization, and a discussion of the uncertainties associated with constituents contributing significantly to site risk are provided in this section.

3.1 Hazard Identification

The hazard identification for Site 09 provides a description of the site; summarizes the data collection, evaluation, and results; and selects the COCs for each medium of interest at the site.

3.1.1 Site Description

Site 09 covers an area of approximately 13.5 acres on the western side of Allen Harbor (Figure 3-1). The landfill is bounded to the east and south by Allen Harbor, and to the northwest by Sanford Road. A fence runs along the west side of Sanford Road, at the edge of Navy property. Access to the landfill is controlled by the fence and a locked gate at the Sanford Road entrance. Access to the site from Allen Harbor is restricted by the very steep landfill toe along the front face of the landfill.

Allen Harbor Landfill is currently overgrown with a mixture of shrubs, small trees, and grasses. The only visible areas of stressed vegetation appear to be the locations of former pavement and/or access roads. Substantial amounts of building demolition debris and rusted metallic objects are visible at various locations across the landfill surface. The landfill rises approximately 15 to 20 feet above the high tide mark along its southeastern perimeter. Large pieces of demolition debris, including significant amounts of structural steel, are visible along the nearby vertical face of the landfill toe. The landfill appears covered with a coarse-grained soil. Although the surface is generally flat, there are several localized swales and berms which appear to consist of cover material which was not completely graded.

From 1946 to 1972, the site was used as a landfill for wastes generated at NCBC Davisville and the former NAS Quonset Point. Limited information is available to indicate landfill operation procedures and waste locations. A variety of municipal and industrial wastes were reportedly disposed of at the site, including used turpentine and acetone, asbestos, paint thinner and degreasers, jet fuel, PCB-contaminated oil, and waste trichloroethylene and carbon tetrachloride.

3.1.2 Data Collection

As shown in Table 3-1, surface soil, subsurface soil, ground water, and surface water samples were collected from Site 09 during the Phase I and Phase II field investigations. Also as shown, shellfish samples were collected from Allen Harbor and Narragansett Bay. Figures 3-2 and 3-3 depict the sample locations for the Phase I and Phase II RIs, respectively, while Figure 3-4 shows the surface water sampling locations for Phase II. The sampling locations for shellfish collected in Allen Harbor and Narragansett Bay are provided in Figures 3-5 and 3-6, respectively. Surface soil samples were collected at intervals of 0 to 0.5 and 0 to 2 feet below grade during Phase I, and from 0.5 to 1, 0 to 1, and 0 to 2 feet below grade during Phase II. Subsurface soil samples at Site 09 were collected to a depth of 46 feet; however, only samples obtained from depths to 10 feet are used in this HHRA. Soil samples taken from the 2 to 10 foot interval are considered subsurface soil samples.

Shellfish

Twenty-three (23) hard-shell clam (i.e., quahog) samples were collected from six subtidal stations within Allen Harbor (Phase I and II sampling). Five composite soft-shell clam samples were collected from three intertidal stations (Phase I sampling), a fourth intertidal station situated on the south shore of Calf Pasture Point (Phase I sampling), and a near-shore intertidal location in Allen Harbor (Phase III sampling). Twenty (20) composite blue mussel samples (two deployed in Phase I and 18 deployed in Phase II) were obtained from three Allen Harbor subtidal stations. Oyster samples were collected from three sampling stations located at the landfill - Allen Harbor interface (Phase I sampling).

Reference samples were collected from subtidal and intertidal locations within Narragansett Bay. Thirty-eight (38) hard-shell clam (i.e., quahog) samples were collected from five subtidal stations (four within Narragansett Bay, one station at North Jamestown and one station on the east side of Prudence Island in Potter Cove; 20 samples collected in Phase I and 18 samples in Phase II). Seven composite soft-shell clam samples were collected from two intertidal stations (Phase I sampling) and from Narrow River and Saltpond (Phase III sampling). Twenty-two (22) composite blue mussel samples (four deployed during Phase I and 18 deployed during Phase II) were collected from two Narragansett Bay subtidal stations. Three oyster samples were collected from near Prudence Island in Phase I.

Additional details pertaining to the data collection including sample analysis are provided in Section 2.1.2.

3.1.3 Data Evaluation

The general steps used to organize the Phase I and Phase II RI data into a form manageable and appropriate for the baseline HHRA are described in Section 2.1.3.

Briefly, specific methods used for Site 09, which correlate with the previously described steps, include the following:

- Three duplicate surface soil samples and one duplicate ground water sample were collected at Site 09 during Phase II.
- Sample recollect data was not obtained in either Phase I or Phase II of the field investigation.
- TICs were reported in surface soil, subsurface soil, and ground water. A number of semi-volatile organic compounds (SVOCs) were tentatively identified in all three media, especially in soils, where as many as 20 SVOCs were tentatively identified, in addition to SVOCs labeled as unknown. Fewer tentatively identified VOCs were reported in soil and ground water. TICs were not reported for pesticides/PCBs. Due to the uncertainty associated with TICs, these constituents are not included in the quantitative assessments of exposure and risk.

Tables 3-2, 3-3, 3-4, 3-5, and 3-6 provide summary statistics (i.e., frequency and range of detects) for constituents detected in surface soils, subsurface soils, ground water, surface water, and shellfish, respectively.

3.1.4 Summary of Surface Soil Data

Table 3-2 presents a summary of the analytical data associated with constituents detected in surface soil, organized by class, including VOCs, SVOCs, pesticides/PCBs and inorganics.

This table includes data which has undergone data evaluation for the purposes of the HHRA. That is, consideration of qualified data, duplicates and SQLs (as described in Section 2.1.3) is incorporated into the data summary. Each class of constituents is discussed in detail below.

- Volatile Organics

  Five VOCs were detected in surface soil: 1,1,1-trichloroethane (detected in three of 41 samples (3/41)), acetone (9/41), chloroform (7/41), tetrachloroethene (3/41), and toluene (3/41). Concentrations of these VOCs are relatively low, and range from 0.001 mg/kg (chloroform and tetrachloroethene) to 0.11 mg/kg (acetone). SQLs for VOCs in surface soil are not unusually high.

- Semi-Volatile Organics

  Thirty (30) SVOCs were detected in surface soil, including 19 PAHs, three phenolic compounds, four phthalate compounds, 1,2,4-trichlorobenzene, benzoic acid, carbazole, and 2,3,7,8-TCDD.

  In general, the PAHs were detected at frequencies greater than 50%. Concentrations range from 0.036 mg/kg (acenaphthylene) to 140 mg/kg (fluoranthene).

  2,4-Dimethylphenol and 4-methylphenol were each detected at a frequency of 1/40, while pentachlorophenol was detected at a frequency of 2/40. Concentrations of these phenolic compounds range from 0.052 mg/kg (pentachlorophenol) to 0.57 mg/kg (4-methylphenol).

  Four phthalate compounds were detected as follows: bis(2-ethylhexyl)phthalate (22/40), butyl benzyl phthalate (7/40), di-n-butyl phthalate (11/40), and diethyl phthalate (1/40). Concentrations range from 0.034 mg/kg (butyl benzyl phthalate) to 5.7 mg/kg (di-n-butyl phthalate).

  1,2,4-Trichlorobenzene was detected once at a concentration of 0.24 mg/kg. Benzoic acid was detected at a frequency of 7/18 at concentrations ranging from 0.049 to 0.87 mg/kg. Carbazole was detected in 14/23 samples at concentrations ranging from 0.075 to 18.0 mg/kg. Finally, 2,3,7,8-TCDD was detected in 5/6 samples and concentrations range from 2.07E-04 to 2.28E-04 mg/kg.

  In general, SQLs for SVOCs in surface soil are not unusually high. SQLs for SVOCs in monitoring well (MW) sample 09-MW1401 were elevated.

Pesticides/PCBs

Eighteen (18) pesticides and two PCBs were detected in surface soils at Site 09. The most frequently detected pesticides include 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT (detected 15/41, 16/41, 12/41, respectively), alpha-chlordane, and gamma-chlordane (detected 11/41 and 13/41, respectively), dieldrin (11/41), and endrin aldehyde (10/23). Concentrations of detected pesticides range from 7E-05 mg/kg (alpha chlordane) to 0.63 mg/kg (p,p'-methoxychlor).

Aroclor-1260 and -1254 were the only detected PCBs in Site 09 surface soil. These PCBs were detected at frequencies of 13/41 and 1/41, respectively at concentrations ranging from 0.017 to 30 mg/kg.

In Phase I, SQLs for pesticides/PCBs in surface soil are somewhat elevated in surface soil (S) samples S-09-02-00-S, S-09-03-00-S, and S-09-04-00-S. SQLs are unusually high in boring (B) sample 09-B1-01 and in sample 09-MW1101 collected in Phase II.

Inorganics

All 24 inorganics were detected in Site 09 surface soil. Of these 24, seven were detected at all 41 locations including aluminum, barium, chromium, iron, lead, magnesium, and manganese. Cyanide (4/41), selenium (4/39), and thallium (1/41) were the inorganics detected least frequently. The range of background concentrations at NCBC Davisville was exceeded in at least one sample for all detected inorganics.

3.1.5 Summary of Subsurface Soil Data

Table 3-3 presents a summary of the analytical data associated with constituents detected in subsurface soil, organized by class including VOCs, SVOCs, pesticides/PCBs, and inorganics. This table includes data which has undergone data evaluation for the purposes of the HHRA. That is, consideration of qualified data, duplicates and SQLs (as described in Section 2.1.3) is incorporated into the data summary. Each class of constituents is discussed in detail as follows.

Volatile Organics

Twelve (12) VOCs were detected in subsurface soil: 1,1,1-trichloroethene (1/20), 2-butanone (2/20), acetone (7/20), benzene (2/20), chlorobenzene (3/20), chloroform (2/20), ethylbenzene (6/20), methylene chloride (1/20), tetrachloroethane (2/20), toluene (6/20), trichloroethene (4/20), and xylenes (total) (9/20). Concentrations of detected VOCs range from 0.001 mg/kg (trichloroethene and xylenes) to 15,000 mg/kg (toluene). SQLs for VOCs are unusually high in subsurface soil sample TP-6-02-S.

Semi-Volatile Organics

Thirty-two (32) SVOCs were detected in subsurface soils at Site 09. Of the 32 SVOCs, 19 were PAHs, three were phenolic compounds, four were phthalates, and three were chlorobenzenes. The final three detected SVOCs include bis(2-chloroisopropyl)ether, carbazole, and n-nitrosodiphenylamine.

The PAHs were generally detected at frequencies greater than 50%, and concentrations range from 0.041 mg/kg (benzo(g,h,i)perylene) to 110 mg/kg (phenanthrene).

Concentrations of 2-methylphenol (1/20), 4-methylphenol (2/20), and phenol (1/20) range from 0.058 mg/kg (2-methylphenol) to 77 mg/kg (phenol).

Detected phthalates include bis(2-ethylhexyl)phthalate (12/20), butyl benzyl phthalate (7/20), di-n-butyl phthalate (6/20), and diethyl phthalate (2/20). Concentrations of these compounds range from 0.043 mg/kg (diethyl phthalate) to 33 mg/kg (bis(2-ethylhexyl)phthalate).

The chlorobenzenes were detected at relatively low frequencies. Concentrations of these chlorobenzenes including 1,2-dichlorobenzene (2/20), 1,2,4-trichlorobenzene (1/20), and 1,4-dichlorobenzene (3/20) range from 0.046 to 4.3 mg/kg.

Bis(2-chloroisopropyl)ether was detected at a frequency of 1/20 at a concentration of 0.065 mg/kg. Carbazole was detected at a frequency of 6/10 at concentrations ranging from 0.06 to 10 mg/kg. N-Nitroso-diphenylamine (1/20) was detected at a concentration of 0.12 mg/kg.

In general, SQLs are somewhat elevated for SVOCs in subsurface soil. SQLs were unusually high in two samples (test pit (TP) sample TP-6-02-S and sample 09-MW5-04).

- Pesticides/PCBs

Seventeen (17) pesticides and two PCBs were detected in subsurface soil at Site 09. 4,4'-DDD, 4,4'-DDE, alpha-chlordane and gamma-chlordane were detected at the greatest frequencies (30% or greater). Concentrations of all detected pesticides range from 6.3E-05 mg/kg (delta-BHC) to 0.89 mg/kg (4,4'-DDE).

Aroclor-1254 (1/20) and Aroclor-1260 (9/20) were detected at concentrations ranging from 0.13 to 1.7 mg/kg. SQLs for pesticides/PCBs in subsurface soil are not unusually high.

- Inorganics

  Twenty-two (22) inorganics were detected in subsurface soil at Site 09. Of these 22, 10 were detected at all 20 locations. These 10 inorganics include aluminum, arsenic, barium, chromium, cobalt, iron, lead, magnesium, manganese, and vanadium. Thallium was the least frequently detected inorganic. Cyanide and selenium were not detected in subsurface soil. The range of background concentrations at NCBC Davisville was exceeded in at least one sample for all inorganics detected.

3.1.6 Summary of Ground Water Data

Table 3-4 presents a summary of the analytical data for constituents detected in Phase I and Phase II ground water samples. This table includes data which has undergone data evaluation for the purposes of the HHRA. That is, consideration of qualified data, duplicates and SQLs (as described in Section 2.1.3) is incorporated into the data summary. Each class of constituents is discussed in detail below.

- Volatile Organics

  Sixteen (16) VOCs were detected in ground water samples collected at Site 09. 1,2-Dichloroethene was detected most frequently (15/27). Concentrations of detected VOCs range from 0.001 mg/l (1,2-dichloroethene, benzene, chlorobenzene, and trichloroethene) to 28 mg/l (1,2-dichloroethene). SQLs for VOCs in ground water are elevated in one sample (09-MW7D).

- Semi-Volatile Organics

  Twenty-eight (28) SVOCs were detected in Site 09 ground water. These 28 compounds include four chlorobenzenes, eight phenols, eight PAHs, two chloroethers, two phthalates, carbazole, dibenzofuran, hexachloroethane, and n-nitroso-di-n-propylamine.

The chlorobenzene compounds were detected infrequently (1/27 or 2/27 samples) and at low concentrations (0.001 to 0.42 mg/l).

The phenols were also detected infrequently (1/27 or 2/27) with the exception of 2,4-dimethylphenol, which was detected in 5/27 samples. Concentrations of these compounds range from 0.001 mg/l (2,4-dimethylphenol, 4-nitrophenol) to 0.86 mg/l (2,4-dimethylphenol).

The PAHs were also detected infrequently (1/27 or 2/27), with the exception of 2-methylnaphthalene (4/27), and naphthalene (6/27). Concentrations of the PAHs range from 0.001 mg/l (naphthalene) to 0.066 mg/l (acenaphthene).

Bis(2-chloroethyl)ether and bis(2-chloroisopropyl)ether were detected at frequencies of 6/27 and 3/27, respectively. Concentrations range from 0.001 to 0.014 mg/l.

Diethyl phthalate and di-n-butyl phthalate were detected infrequently (2/27 and 1/27, respectively) and at low concentrations (ranging from 0.001 to 0.002 mg/l).

The remaining detected SVOCs were detected 2 or fewer times, and concentrations range from 0.001 mg/l (n-nitroso-di-n-propylamine) to 0.01 mg/l (carbazole).

SQLs for SVOCs in ground water are somewhat elevated in sample 09-MW6S.

- Pesticides/PCBs

Three pesticides, but no PCBs were detected at Site 09 in ground water samples. These pesticides include 4,4'-DDD (1/27 at a concentration of 3.7E-06 mg/l), alpha-chlordane (1/27 at a concentration of 1.2E-05 mg/l), and dieldrin (2/27 at a concentration of 2.4E-06 mg/l). SQLs for pesticides/PCBs in ground water are not unusually high.

- Inorganics

With the exception of selenium, all inorganics analyzed for were detected in Site 09 ground water. Barium, calcium, iron, magnesium, manganese, potassium, and sodium were detected in all 27 ground water samples. The least frequently detected inorganics include antimony (3/27), beryllium (2/27), cadmium (3/27), cyanide (1/26), nickel (1/27), silver (3/27), and thallium (2/27). No upgradient well samples were available at Site 09 to use for comparative purposes.

It is important to note that a comparison of Phase I and Phase II results indicates a considerable decrease in the concentration of inorganics in Phase II. This decrease is believed due to the improved sampling methodology utilized in Phase II which incorporated a low flow rather than a high flow technique, thereby decreasing the turbidity of the ground water samples. Thus, the Phase II ground water data are thought to be more reflective of the actual concentrations of inorganics than the Phase I data.

3.1.7 Summary of Surface Water Data

Table 3-5 presents a summary of the analytical data for constituents detected in the Phase II surface water samples. This table includes data which has undergone data evaluation for the purposes of the HHRA. That is, consideration of qualified data, duplicates and SQLs (as described in Section 2.1.3) is incorporated into the data summary. Each class of constituents is discussed in detail below.

- Volatile Organics

  Four VOCs were detected in ground water samples collected at Site 09, including carbon disulfide, 1,2-dichloroethene (total), 1,1,2,2-tetrachloroethane, and trichloroethene. Each was detected in 1/4 samples. Concentrations of detected VOCs range from 0.002 mg/l (carbon disulfide and trichloroethene) to 0.006 mg/l (1,2-dichloroethene (total)). SQLs for VOCs in surface water are somewhat elevated in all samples.

- Semi-Volatile Organics

  None of the 64 SVOCs analyzed for presence were detected in surface water at Site 09.

- Pesticides/PCBs

  None of the 21 pesticides nor the seven PCBs analyzed for presence were detected in Site 09 surface water.

- Inorganics

  Ten (10) inorganics were detected in Site 09 surface water. Calcium, iron, magnesium, manganese, potassium, and sodium were detected in all four samples. The remaining inorganics (aluminum, arsenic, chromium, and vanadium) were each detected at a frequency of 1/4.

3.1.8 Summary of Shellfish Data

Table 3-6 presents a summary of the analytical data associated with constituents detected in shellfish (clams, mussels and oysters) collected or deployed within Allen Harbor, organized by class, including SVOCs, pesticides/PCBs and inorganics. Each class of constituents is discussed in detail below.

- Semi-Volatile Organics

  Clams - Seventeen (17) speciated SVOCs were detected in clams including 15 PAHs, benzotriazole and chlorinated benzotriazole. In general, the PAHs were detected at frequencies greater than 95%, with the exception of coronene (detected in 14/28 of the clam samples). Concentrations range from 5.8E-05 mg/kg (dibenzo(a,h)anthracene) to 0.041 mg/kg (fluoranthene). Benzotriazole and chlorinated benzotriazole were each detected in all 28 clam samples. Concentrations range from 0.0014 mg/kg (chlorinated benzotriazole) to 0.082 mg/kg (benzotriazole).

  Mussels - Seventeen (17) speciated SVOCs were detected in mussels including 15 PAHs, benzotriazole and chlorinated benzotriazole. All of the PAHs, with the exception of dibenzo(a,h)anthracene and coronene (detected at frequencies of 19/20 and 9/20, respectively), were detected in all of the 20 mussel samples. Concentrations range from 1.0E-04 mg/kg (coronene) to 0.089 mg/kg (fluoranthene). Benzotriazole and chlorinated benzotriazole were each detected at a frequency of 100%. Concentrations range from 0.027 mg/kg (chlorinated benzotriazole) to 0.11 mg/kg (benzotriazole).

  Oysters - Seventeen (17) SVOCs were detected in oysters including 15 PAHs, benzotriazole and chlorinated benzotriazole. All of the PAHs were detected at a frequency of 100% at concentrations ranging from 9.0E-05 mg/kg (benzo(g,h,i)perylene) to 0.03 mg/kg (pyrene). Benzotriazole and chlorinated benzotriazole were also each detected at a frequency of 100%, with concentrations ranging from 5.6E-04 mg/kg (chlorinated benzotriazole) to 0.021 mg/kg (benzotriazole).

In general, the detected concentrations for SVOCs in shellfish (clams, mussels and oysters) were greater than the MDLs.

- Pesticides/PCBs

Clams - Eight pesticides and two PCBs (Aroclor-1242 and -1254) were detected in clams collected within Allen Harbor. The pesticides were detected at the following frequencies: gamma-BHC (20/26); alpha-BHC and p,p'-DDT (21/26); alpha-chlordane (22/26); p,p'-DDD (23/26); p,p'-DDE and hexachlorobenzene (24/26);and gamma-chlordane (25/26). Concentrations range from 2.7E-05 mg/kg (p,p'-DDE) to 0.007 mg/kg (p,p'-DDD). Aroclor-1242 and -1254 were the only detected PCBs in clams collected within Allen Harbor. These PCBs were detected at frequencies of 11/28 and 28/28, respectively, at concentrations ranging from 1.2E-04 to 0.11 mg/kg.

Mussels - Eight pesticides and two PCBs (Aroclor-1242 and -1254) were detected in mussels deployed within Allen Harbor. Each of the constituents was detected at a frequency of 100%, with the exception of alpha-chlordane (detected in 19 of 20 mussel samples). The range of concentrations for detected pesticides is 7.4E-05 mg/kg (gamma-BHC) to 0.0029 (p,p'-DDD). The PCBs were detected at concentrations ranging from 0.0012 to 0.195 mg/kg.

Oysters - Eight pesticides and two PCBs (Aroclor-1242 and -1254) were detected in oysters collected within Allen Harbor. All of the pesticides were detected in 3/3 samples, with the exception of hexachlorobenzene (detected in only 1 of 3 oyster samples). Concentrations range from 2.8E-05 mg/kg (hexachlorobenzene) to 0.0048 mg/kg (p,p'-DDE).

In general, the detected concentrations for pesticides/PCBs in shellfish (clams, mussels, and oysters) were greater than the MDLs.

- Inorganics

Clams - Eleven (11) inorganics were detected in clams collected within Allen Harbor. All of the inorganics, with the exception of mercury (detected in 3/4 clam samples), were detected at a frequency of 100%. Concentrations of detected inorganics range from 0.0071 mg/kg (mercury) to 1,310 mg/kg (iron).

Mussels - Ten (10) inorganics were detected in mussel samples, each at a frequency of 100%. Concentrations range from 0.085 mg/kg (chromium) to 130 mg/kg (iron).

Oysters - Ten (10) inorganics were detected in oysters collected within Allen Harbor, each at a frequency of 100% Concentrations of detected inorganics range from 0.0036 mg/kg (chromium) to 544 mg/kg (zinc).

In general, the detected concentrations for inorganics in shellfish (clams, mussels and oysters) were greater than the MDLs.

3.1.9 Selection of Constituents of Potential Concern

The general factors considered to select COCs are described in Section 2.1.4. Tables 3-2, 3-3, 3-4, 3-5, and 3-6 summarize the range of concentrations for constituents detected in surface soil, subsurface soil, ground water, surface water, and shellfish, respectively.

The COCs in these media are shown in Table 3-7. In surface soil, five VOCs, 24 SVOCs, 16 pesticides/PCBs, and 17 inorganics are selected as COCs. In subsurface soil, 10 VOCs, 26 SVOCs, 12 pesticides/PCBs, and 16 inorganics are selected as COCs. With the exception of Aroclor-1254, methylene chloride, bis(2-chloroisopropyl)ether, and phenol, all COCs in soil evaluated in the Phase I HHRA are subsequently evaluated in this Phase II HHRA. These constituents were not selected due to a low frequency of detection in soils. Additional COCs have been selected and include four VOCs (2-butanone, chlorobenzene, tetrachloroethene, and 1,1,1-trichloroethane), eight SVOCs (acenaphthylene, butyl benzyl phthalate, carbazole, di-n-butyl phthalate, diethyl phthalate, 1,2-dichlorobenzene, 1,4-dichlorobenzene, and 2,3,7,8-TCDD), 15 pesticides/PCBs (aldrin, alpha- and beta-BHC, alpha- and gamma-chlordane, 4,4'-DDT, dieldrin, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, heptachlor, heptachlor epoxide, and p,p'-methoxychlor), and six inorganics (aluminum, barium, cobalt, mercury, thallium, and selenium).

In ground water, 11 VOCs, 15 SVOCs, one pesticide, and 16 inorganics are selected as COCs. All COCs in ground water evaluated in the Phase I HHRA are subsequently evaluated in this Phase II HHRA. Additional COCs have been selected and include five VOCs (acetone, chlorobenzene, 1,2-dichloroethane, 1,2-dichloroethene, and 1,2-dichloropropane), 14 SVOCs (acenaphthene, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)ether, dibenzofuran, 1,2-dichlorobenzene, 1,4-dichlorobenzene, diethyl phthalate, 2,4-dimethylphenol, fluorene, 2-methylphenol, 4-methylphenol, 4-nitrophenol, and phenol), one pesticide (dieldrin), and 12 inorganics (aluminum, barium chromium, cobalt, copper, lead, manganese, mercury silver, thallium, vanadium, and zinc). Although detected in ground water, calcium, iron, magnesium, potassium, and sodium are excluded from further consideration based on their low potential for contributing to health risk.

In surface water, five inorganics and four volatiles are selected as COCs. The inorganics include aluminum, arsenic, chromium, manganese, and vanadium. The volatiles are carbon disulfide, 1,2-dichloroethene (total), 1,1,2,2-tetrachloroethane, and trichloroethene. Although detected in surface water, calcium, iron, magnesium, potassium, and sodium are excluded from further consideration based on their low potential for contributing to health risk.

In shellfish, nine to 10 inorganics, 17 SVOCs, and 10 pesticides/PCBs are selected as COCs. The shellfish COCs not already identified for the other media discussed above include five SVOCs (benzotriazole, chlorinated benzotriazole, benzo(e)pyrene, coronene, and perylene), and four pesticides/PCBs (gamma-BHC, hexachlorobenzene, Aroclor-1242, and Aroclor-1254). For clams, mussels, and oysters, iron is excluded as a COC due to its low potential for contributing to health risk and its essential nutrient status. In addition, the chemical groups comprised of non-specified constituents (e.g., the group identified as "MW302" or the sum of the PAHs with a molecular weight of 302 g/mol) are also excluded from further consideration.

The rationale for excluding detected constituents from the list of COCs is provided in Table 3-8.

3.2 Dose-Response Assessment

Section 2.2 presents information on the non-carcinogenic and carcinogenic effects associated with the identified constituents of potential concern. If available, non-cancer and cancer toxicity values from EPA's (1993a) IRIS database or EPA's (1993b) HEAST are used. The cancer and non-cancer values used in the HHRA are presented in Tables 2-2 through 2-7. Appendix A provides brief toxicity profiles which summarize the bases for these values.

Constituents at Site 09 for which EPA (1992a, 1993a, 1993b) has not developed toxicity values are excluded from the quantitative risk characterization and include:

- one VOC (1,1,1-trichloroethane),
- twelve (12) SVOCs (acenaphthylene, benzotriazole, chlorinated benzotriazole, benzo(e)pyrene, benzo(g,h,i)perylene, coronene, carbazole, dibenzofuran, 2-methylnaphthalene, 4-nitrophenol, perylene, and phenanthrene),
- three pesticides (endosulfan sulfate, endrin aldehyde, and endrin ketone), and
- three inorganics (aluminum, cobalt, and lead).

A qualitative risk evaluation of these constituents is provided in Section 3.4.2. Section 2.2.3 provides a discussion of the approach used to evaluate potential impacts of exposure to lead, which does not currently have an assigned toxicity value.

3.3 Exposure Assessment

This exposure assessment and associated tables and appendices i) identify the exposure scenarios and pathways of interest, ii) calculate the EPCs used in quantifying constituent exposures, and iii) estimate the constituent-specific exposure doses for each pathway and scenario.

3.3.1 Selection of Exposure Scenarios and Pathways

The general exposure scenarios developed for the Phase II HHRA are described in Section 2.3.1. Site 09 is bounded by Allen Harbor and Sanford Road. Access to the landfill is controlled by a fence and gate on Sanford Road, and by a steep slope along Allen Harbor. Chain-linked fences in combination with locked gates and a patrolling security force currently limit public access to all NCBC Davisville sites. The entire NCBC Davisville base is scheduled to close within one year.

Based on a consideration of the NCBC Davisville Comprehensive Reuse Plan (September 1993) and potential current and future land uses at Site 09, the general human exposure scenarios selected for the purposes of the Phase II HHRA (and discussed in detail in Section 2.3.1) include future construction activities at the site, future recreational use of the site, and future ingestion of shellfish from Allen Harbor. Residential development is not included in the land reuse plan for the area of the NCBC Davisville facility in which Site 09 is located (i.e., Allen Harbor), and is therefore highly unlikely at this site. For this reason, potential exposures and risks under an on-site residential scenario are not evaluated in this Phase II assessment of Site 09.

3.3.2 Estimation of Exposure Point Concentrations

As specified in the Region I Supplemental Risk Assessment Guidance (EPA, 1989b), two types of exposure point concentrations are identified for each constituent of potential concern in each medium: the geometric mean and the maximum detected concentration.

Collectively, these two exposure point concentrations allow for average and upper-bound estimates of health risk. The data used to determine the geometric means and maximum concentrations of constituents in surface soil, subsurface soil, ground water, surface water, and shellfish associated with Site 09 are provided in Appendix C.

The exposure point concentrations for constituents adsorbed to suspended particulates are calculated using the EPA (1988a) fugitive dust model described in Section 2.3.2. Using this approach and a site area of 15 acres (i.e., an effective width of 246 meters), the estimated fugitive dust concentration for Site 09 is 8E-09 kg/m^3. The fugitive dust calculations are provided at the end of Appendix C.

The exposure point concentrations for the media evaluated in the HHRA are provided in Tables 3-9 to 3-13 as follows:

Table	Medium	Relevant Scenario
3-9	Surface soil (0 to 2 feet)	Scenario 2 (future recreation)
3-10	Subsurface soil (2 to 10 feet)	Scenario 1 (future construction)
3-11	Ground water	Scenario 2 (future recreation)
3-12	Surface water	Scenario 2 (future recreation)
3-13	Shellfish	Scenario 3 (future shellfishing)

3.3.3 Estimation of Constituent Exposure Doses

The estimated constituent exposure doses (mean and RME) for each pathway and scenario are presented along with the risk estimates in Appendix D. A discussion of the risk estimates and tabular summaries of the risk estimates are provided in Section 3.4 and Tables 3-14 to 3-17. The equations and input parameters used to estimate these exposure doses follow Region I (EPA, 1989b) guidance and are provided by scenario in Section 2.3.3. The input parameters are also summarized and compared with Phase I values in Table 2-8.

Key exposure parameters and assumptions for each scenario are described below:

Scenario 1 (Future Construction)

The exposure pathways, equations, and input values for the future construction scenario are provided in Section 2.3.3. Similar to the Phase I HHRA (TRC-ECI, 1991), worker exposure to site constituents is assumed to occur through incidental ingestion of and dermal contact with subsurface soils (2 to 10 feet). The Phase II construction scenario also evaluates worker exposure through inhalation of suspended subsurface soil particulates and inhalation of volatiles from subsurface soil. Additional changes in exposure assumptions have also been made in the Phase II construction scenario. These changes are highlighted in Section 2.3.3 and Table 2-8.

Scenario 2 (Future Recreation)

Section 2.3.3 summarizes the exposure pathways, equations, and input values for the future recreational scenario. Exposure to site constituents is assumed to occur through incidental ingestion of and dermal contact with surface soils (0 to 2 feet); dermal contact with ground water and inhalation of volatiles (from ground water) during showering; and incidental ingestion of and dermal contact with surface water while swimming. As indicated in Section 2.3.3 and Table 2-8, a recreational scenario was not evaluated in the Phase I HHRA.

Scenario 3 (Future Shellfishing)

Exposure of off-site adult residents through the ingestion of shellfish (i.e., clams, mussels, and oysters) from Allen Harbor are considered in this scenario. This exposure scenario was not evaluated in the Phase I HHRA.

3.4 Risk Characterization

3.4.1 Quantitative Risk Assessment

The results of the quantitative risk analysis are presented in two forms. In the case of human health effects associated with exposure to potential carcinogens, risk estimates are expressed as the lifetime probability of additional cancer risk associated with the given exposure.

For determining whether non-cancer health effects may be a concern, constituent-specific HQs are calculated. These HQs are then summed across constituents to estimate total pathway HIs. Section 2.4 provides additional information on the calculation of cancer risks and non-cancer HIs.

Cancer risks and non-cancer HIs are discussed below for Scenario 1 (future construction), Scenario 2 (future recreation), and Scenario 3 (future shellfishing). Cancer risks and non-cancer HIs are discussed in the subsequent sections for each scenario and pathway evaluated. These cancer risks and non-cancer HIs are presented as ranges in which both the average case (based on the geometric mean concentrations) and the RME case (based on the maximum concentrations detected on-site) are provided.

Table 3-14 presents a summary of the estimated cancer risks for all scenarios. As a comparison, Table 3-15 provides the cancer risks estimated using TEFs for carcinogenic PAHs. Only those pathways for which carcinogenic PAHs are associated with cancer risks above 1E-06 are shown in this table. Table 3-16 presents the estimated cancer risks for Scenario 3 (future shellfishing) calculated using alternate ingestion rates (i.e., those provided in EPA (1990)). The estimated non-cancer hazard indices for all scenarios are provided in Table 3-17. The chemical-specific cancer risks and non-cancer HQs are provided by scenario and pathway in Appendix D.

Scenario 1 (Future Construction): Cancer Risks and Non-Cancer HIs

In this scenario, cancer risks and non-cancer HIs are calculated for incidental ingestion of and dermal contact with subsurface soil, and inhalation of suspended particulates and volatilized constituents from subsurface soil by adult construction workers.

As shown in Table 3-14, the total cancer risks for incidental ingestion of subsurface soil range from 4E-06 (mean) to 1E-04 (RME). As shown in Table D-1 of Appendix D, these levels, which exceed 1E-06 by 4- and 100-fold, respectively, are primarily attributable to arsenic, beryllium, and the carcinogenic PAHs in subsurface soil. Cancer risks for these individual COCs exceed 1E-06 only for the RME case. Cancer risks associated with dermal contact with subsurface soil, inhalation of suspended subsurface particulates, and inhalation of volatile constituents are less than 1E-06 by at least one order of magnitude. As shown in Table 3-15, the cancer risks for incidental ingestion of subsurface soil range from 2E-06 (mean) to 3E-05 (RME) when calculated using the TEFs for carcinogenic PAHs. These estimated risks still exceed 1E-06 by 2- and 30-fold, respectively.

As shown in Table 3-17, the HI for incidental ingestion of soil ranges from 3E-01 (mean) to 3E+00 (RME). The RME HI of 3E+00 is attributable primarily to antimony in soil, with an HQ of 1E+00. The total HIs associated with dermal contact with subsurface soil and inhalation of suspended subsurface particulates are below 1E+00. The HIs for inhalation of volatiles from subsurface soil range from 6E-04 (mean) to 2E+01 (RME). The RME HI of 2E+01 exceeds 1E+00 by a factor of 20, and is nearly 100% attributable to toluene in subsurface soil. The RME HI is based on a maximum detected concentration of 15,000 mg/kg of toluene in soil. This maximum value exceeds the range of other detected toluene concentrations (0.2 to 0.4 mg/kg) in soil by five orders of magnitude.

Scenario 2 (Future Recreation): Cancer Risks and Non-Cancer HIs

In this scenario, cancer risks and non-cancer HIs are calculated for children/youths (aged 2 to 18 yrs) using recreational areas at the site. Children/youths are assumed exposed through incidental ingestion of and dermal contact with surface soil, inhalation of volatiles and dermal contact with ground water while showering, and dermal contact and ingestion of surface water while swimming.

As shown in Table 3-14, the total cancer risks for incidental ingestion of surface soil range from 1E-05 (mean) to 6E-04 (RME). These risk levels exceed 1E-06 by factors of 10 and 600, respectively. As shown in Table D-2 of Appendix D, the COCs which contribute the majority of this cancer risk and which are associated with individual cancer risks above 1E-06 include arsenic (RME only), beryllium (RME only), carcinogenic PAHs (RME only, except for benzo(b/k)fluoranthene), 2,3,7,8-TCDD, and Aroclor-1260 (RME only). The carcinogenic PAHs contribute most of the total RME cancer risk, while for the average case, the carcinogenic PAHs and 2,3,7,8-TCDD each contribute about 50% of the total cancer risk. As shown in Table 3-15, the cancer risks for incidental ingestion of surface soil range from 9E-06 (mean) to 2E-04 (RME) when calculated using the TEFs for carcinogenic PAHs. These risks still exceed 1E-06 by 9- and 200-fold, respectively. The total cancer risk associated with dermal exposure to soil ranges from 6E-07 (mean) to 7E-06 (RME). The RME cancer risk exceeds 1E-06 by 7-fold. Aroclor-1260 contributes nearly 100% of the RME risk and is the only COC associated with an individual cancer risk above 1E-06. The total cancer risk associated with dermal contact with ground water while showering ranges from 2E-07 (mean) to 7E-05 (RME). The RME cancer risk exceeds 1E-06 by a factor of 70. Vinyl chloride contributes approximately 100% of this risk and is the only COC with an individual cancer risk above 1E-06. The total cancer risks for inhalation of volatiles while showering ranges from 2E-06 (mean) to 8E-04 (RME). These levels exceed 1E-06 by factors of 2 and 800, respectively. Vinyl chloride contributes nearly 100% of the risk for both the mean and the RME cases. The other COCs for which the individual cancer risks for inhalation of volatiles exceed 1E-06 are 1,2-dichloropropane and trichloroethene under the RME case, with estimated RME risks of 4E-06 and 3E-06, respectively. The estimated cancer risks associated with incidental ingestion of and dermal contact with surface water while swimming are less than 1E-06 by at least an order of magnitude.

As shown in Table 3-17, the estimated non-cancer HIs for incidental ingestion of surface soil, dermal contact with surface soil, and dermal contact with ground water while showering do not exceed 1E+00. The non-cancer HIs for inhalation of volatiles while showering range from 5E-03 (mean) to 2E+00 (RME) with the RME HI exceeding 1E+00 by a factor of 2. 1,2-Dichloroethene contributes the majority of the non-cancer HI, and is the only COC with an individual HQ greater than 1E+00. The estimated non-cancer HIs for incidental ingestion of and dermal contact with surface water are less than 1E+00.

Scenario 3 (Future Shellfishing): Cancer Risks and Non-Cancer HIs

In this scenario, cancer risks and non-cancer HIs are calculated for off-site adult residents assumed to ingest shellfish (clams, mussels, and oysters) from Allen Harbor.

As shown in Table 3-14, the estimated cancer risks across all three shellfish types range from 7E-06 (mean for clams) to 1E-05 (RME for clams and mussels). These cancer risks exceed 1E-06 by factors of 7 and 10, respectively. For all three shellfish types, arsenic and Aroclor-1254 are the only COCs associated with individual cancer risks greater than 1E-06. With the exception of Aroclor-1254 in clams, these individual COCs exceed 1E-06 under both the mean and RME cases. Table 3-16 provides a comparison of resultant cancer risks through substitution of the ingestion rate provided by Narragansett Bay Project (n.d.) with alternate ingestion rates (EPA, 1990a). Use of these alternate ingestion rates results in arsenic (in clams) as the only COC associated with individual cancer risks greater than 1E-06. Further, the pathway risks for ingestion of mussels no longer exceed 1E-06.

As shown in Table 3-17, the non-cancer HIs for ingestion of shellfish are less than 1E+00.

3.4.2 Qualitative Analysis of Risks

As indicated in Section 3.2, 19 COCs are not evaluated in the quantitative HHRA due to lack of EPA toxicity criteria (EPA, 1993a,b). These COCs include:

- one VOC (1,1,1-trichloroethane),
- twelve (12) SVOCs (acenaphthylene, benzotriazole, chlorinated benzotriazole, benzo(e)pyrene, benzo(g,h,i)perylene, carbazole, coronene, dibenzofuran, 2-methylnaphthalene, 4-nitrophenol, perylene, and phenanthrene),

three pesticides (endosulfan sulfate, endrin aldehyde, and endrin ketone), and

- three inorganics (aluminum, cobalt, and lead).

A qualitative assessment of these COCs is provided below.

- Volatile Organics

Although 1,1,1-trichloroethane is identified as a COC in surface soil, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). 1,1,1-Trichloroethane was detected in surface soil at 0.002 to 0.004 mg/kg in surface soil (mean of 0.0077 mg/kg). While the absence of toxicity values for 1,1,1-trichloroethane contributes some uncertainty to the quantitative evaluation for surface soil, the detected concentrations and detection frequency (3/41) are relatively low. Further, the concentrations of 1,1,1-trichloroethane and the other volatile COCs in surface soil are similar and these other volatile COCs (e.g., acetone, chloroform, tetrachloroethene, and toluene) are associated with non-cancer HQs well below 1E+00 (i.e., in the range of 1E-08 to 1E-06). Thus, the exclusion of 1,1,1-trichloroethane is unlikely to underestimate the potential non-cancer impacts associated with exposures to surface soil.

- Semi-Volatile Organics

Although acenaphthylene is identified as a COC in surface soil and subsurface soil, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Acenaphthylene was detected at 0.036 to 0.91 mg/kg in surface soil (mean of 0.38 mg/kg) and 0.047 to 0.051 mg/kg in subsurface soil (mean of 0.31 mg/kg). In the absence of toxicity criteria, non-carcinogenic

PAHs are assumed to exhibit similar toxicity as naphthalene per EPA Region I guidance. Since the mean and maximum concentrations of acenaphthylene in surface and subsurface soil are similar or less than those for naphthalene (mean of 0.32 mg/kg and maximum of 9.3 mg/kg in surface soil and mean of 0.54 mg/kg and maximum of 19 mg/kg in subsurface soil) and the estimated HQs for naphthalene in surface and subsurface soil are well below 1E+00 (in the range of 6E-06 to 2E-03), it is unlikely that exclusion of acenaphthylene from the quantitative HHRA contributes to an underestimation of the potential non-cancer impacts.

Although benzotriazole and chlorinated benzotriazole are identified as COCs in shellfish, EPA toxicity criteria are not available for these constituents (EPA, 1993a,b). Benzotriazole was detected at 0.0048 to 0.082 mg/kg in clams (mean of 0.021 mg/kg), 0.020 to 0.11 mg/kg in mussels (mean of 0.045 mg/kg), and 7.1E-04 to 0.0021 mg/kg in oysters (mean of 0.0014 mg/kg). Chlorinated benzotriazole was detected at 0.0014 to 0.0084 mg/kg in clams (mean of 0.0031 mg/kg), 0.0027 to 0.019 mg/kg in mussels (mean of 0.0052 mg/kg), and 5.6E-04 to 7.5E-04 mg/kg in oysters (mean of 6.6E-04 mg/kg). In the absence of toxicity criteria for these or similar constituents, the concentrations of benzotriazole and chlorinated benzotriazole in Allen Harbor shellfish are compared to those for reference stations in Narragansett Bay (see Table C-7 in Appendix C). The mean and maximum concentrations of these two constituents in all three shellfish types (clams, mussels, and oysters) in Allen Harbor are similar to or less than those for Narragansett Bay. Thus, while there is some uncertainty associated with the exclusion of benzotriazole and chlorinated benzotriazole from the quantitative HHRA, the concentrations of these COCs are consistent with area-wide concentrations.

Although benzo(e)pyrene is identified as a COC in shellfish, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Benzo(e)pyrene was detected at 6.9E-04 to 0.0071 mg/kg in clams (mean of 0.0018 mg/kg), 0.0033 to 0.0074 mg/kg in mussels (mean of 0.0053 mg/kg), and 0.0015 to 0.0023 mg/kg in oysters (mean of 0.0018 mg/kg). In the absence of toxicity criteria, non-carcinogenic PAHs are assumed to exhibit similar toxicity as naphthalene per EPA Region I guidance. Although naphthalene is not identified as a COC in shellfish, the RfDs for the non-carcinogenic PAHs that are identified as COCs in shellfish (anthracene, fluoranthene, fluorene, and pyrene) are similar to the RfD for naphthalene. Since concentrations of benzo(e)pyrene are similar or less than those for these other PAHs and the estimated non-cancer HQs for these other PAHs are sufficiently low (in the range of 3E-08 to 4E-05), it is unlikely that the exclusion of benzo(e)pyrene from the quantitative HHRA underestimates the potential non-cancer impacts associated with ingestion of shellfish from Allen Harbor. Also note that none of the carcinogenic PAHs identified as COCs in shellfish are associated with cancer risks above 1E-06.

Although benzo(g,h,i)perylene is identified as a COC in surface soil, subsurface soil, and shellfish, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Benzo(g,h,i)perylene was detected at 0.07 to 29 mg/kg in surface soil (mean of 0.47 mg/kg), 0.041 to 15 mg/kg in subsurface soil (mean of 0.63 mg/kg), 1.3E-04 to 0.0043 mg/kg in clams (mean of 4.9E-04 mg/kg), 4.1E-04 to 0.0018 mg/kg in mussels (mean of 9E-04 mg/kg), and 9E-05 to 2.3E-04 mg/kg in oysters (mean of 1.4E-04 mg/kg). In the absence of toxicity criteria, non-carcinogenic PAHs are assumed to exhibit similar toxicity as naphthalene per EPA Region I guidance. Since the mean and maximum concentrations of benzo(g,h,i)perylene in subsurface soil are similar or less than those for naphthalene (mean of 0.54 mg/kg and maximum of 19 mg/kg) and the estimated HQs for naphthalene in subsurface soil are well below 1E+00 (in the range of 6E-05 to 2E-03), it is unlikely that exclusion of benzo(g,h,i)perylene from the quantitative evaluation contributes to an underestimation of the potential non-cancer impacts for this medium. Although the maximum detected concentration of benzo(g,h,i)perylene in surface soil is roughly 10-fold greater than the maximum for naphthalene (9.3 mg/kg), the means for these two constituents (0.32 mg/kg for naphthalene) are similar. Further, the HQs associated with naphthalene in surface soil are sufficiently low (in the range of 6E-06 to 2E-04) such that the maximum concentration of benzo(g,h,i)perylene in surface soil is not likely to be of concern. While naphthalene is not a COC in shellfish, the concentrations of benzo(g,h,i)perylene in clams, mussels, and oysters are similar to those for the other non-carcinogenic PAHs (e.g., anthracene, fluoranthene, fluorene, and pyrene) and non-cancer HQs for these PAHs are well below 1E+00 (in the range of 3E-08 to 4E-05). For this reason, exclusion of benzo(g,h,i)perylene from the quantitative evaluation is unlikely to underestimate the potential non-cancer impacts associated with ingestion of shellfish from Allen Harbor.

Although carbazole is identified as a COC in surface soil and subsurface soil, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Carbazole was detected at 0.075 to 18 mg/kg in surface soil (mean of 0.53 mg/kg) and 0.066 to 10 mg/kg in subsurface soil (mean of 0.63 mg/kg). Based on the absence of toxicity criteria for this or structurally similar constituents, exclusion of carbazole contributes some degree of uncertainty to the quantitative evaluation for the media discussed above.

Although coronene is identified as a COC in shellfish, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Coronene was detected at 1.0E-04 to 5.2E-04 mg/kg in clams (mean of 1.7E-04 mg/kg), 1.0E-04 to 4.5E-04 mg/kg in mussels (mean of 1.5E-04 mg/kg), and 2.5E-05 to 7.2E-05 mg/kg in oysters (mean of 4.5E-05 mg/kg). In the absence of toxicity criteria, non-carcinogenic PAHs are assumed to exhibit similar toxicity as naphthalene per EPA Region I guidance. Although naphthalene is not identified as a COC in shellfish, the RfDs for the non-carcinogenic PAHs that are identified as COCs in shellfish (anthracene, fluoranthene, fluorene, and pyrene) are similar to the RfD for naphthalene. Since mean and maximum concentrations of coronene in clams, mussels, and oysters are similar or less than those for these other PAHs and the estimated non-cancer HQs for these other PAHs are sufficiently low (in the range of 3E-08 to 4E-05), it is unlikely that the exclusion of coronene from the quantitative HHRA underestimates the potential non-cancer impacts associated with ingestion of shellfish from Allen Harbor.

Although dibenzofuran is identified as a COC in surface soil, subsurface soil, and ground water, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Dibenzofuran was detected at 0.04 to 8.4 mg/kg in surface soil (mean of 0.21 mg/kg), 0.092 to 12 mg/kg in subsurface soil (mean of 0.46 mg/kg), and 0.002 to 0.024 mg/l in ground water (mean of 0.011 mg/l). Based on the absence of toxicity criteria for this or structurally similar constituents, exclusion of dibenzofuran contributes some degree of uncertainty to the quantitative evaluation for the media discussed above.

Although 2-methylnaphthalene is identified as a COC in surface soil, subsurface soil, and ground water, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b).

2-Methylnaphthalene was detected at 0.042 to 4.3 mg/kg in surface soil (mean of 0.37 mg/kg), 0.19 to 5.0 mg/kg in subsurface soil (mean of 0.71 mg/kg), and 0.003 to 0.025 mg/l in ground water (mean of 0.11 mg/l). In the absence of toxicity criteria, non-carcinogenic PAHs are assumed to exhibit similar toxicity as naphthalene per EPA Region I guidance. Since the mean and maximum concentrations of 2-methylnaphthalene in surface soil, subsurface soil, and ground water are similar or less than those for naphthalene and the estimated HQs for naphthalene in these media are well below 1E+00 (in the range of 6E-06 to 2E-03), it is unlikely that exclusion of 2-methylnaphthalene from the quantitative HHRA contributes to an underestimation of the potential non-cancer impacts.

Although perylene is identified as a COC in shellfish, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Perylene was detected at 1.6E-04 to 0.0023 mg/kg in clams (mean of 4.1E-04 mg/kg), 4.4E-04 to 0.0014 mg/kg in mussels (mean of 8.1E-04 mg/kg), and 1.3E-04 to 2.5E-04 mg/kg in oysters (mean of 1.8E-04 mg/kg). In the absence of toxicity criteria, non-carcinogenic PAHs are assumed to exhibit similar toxicity as naphthalene per EPA Region I guidance. Although naphthalene is not identified as a COC in shellfish, the non-cancer RfDs for the non-carcinogenic PAHs that are identified as COCs in shellfish (anthracene, fluoranthene, fluorene, and pyrene) are similar to the RfD for naphthalene. Since concentrations of coronene in clams, mussels, and oysters are similar or less than those for these other PAHs and the estimated non-cancer HQs for these other PAHs are sufficiently low (in the range of 3E-08 to 4E-05), it is unlikely that the exclusion of coronene from the quantitative HHRA underestimates the potential non-cancer impacts associated with ingestion of shellfish from Allen Harbor.

Although phenanthrene is identified as a COC in surface soil, subsurface soil, and shellfish, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Phenanthrene was detected at 0.052 to 120 mg/kg in surface soil (mean of 1.0 mg/kg), 0.078 to 110 mg/kg in subsurface soil (mean of 1.4 mg/kg), 4.7E-04 to 0.0078 mg/kg in clams (mean of 0.0021 mg/kg), 9.2E-04 to 0.013 mg/kg in mussels (mean of 0.0035 mg/kg), and 0.0041 to 0.0052 mg/kg in oysters (mean of 0.0046 mg/kg). In the absence of toxicity criteria, non-carcinogenic PAHs are assumed to exhibit similar toxicity as naphthalene per EPA Region I guidance. Although the mean and maximum concentrations for phenanthrene in surface soil and subsurface soil exceed those for naphthalene, the non-cancer HQs associated with naphthalene in surface and subsurface soil are sufficiently low (in the range of 6E-06 to 2E-03) such that the concentrations of phenanthrene in soil are not likely to be of concern. While naphthalene is not a COC in shellfish, the concentrations of phenanthrene in clams, mussels, and oysters are similar to those for the other non-carcinogenic PAHs (e.g., anthracene, fluoranthene, fluorene, and pyrene) and non-cancer HQs for these PAHs are well below 1E+00 (in the range of 3E-08 to 4E-05). For this reason, exclusion of phenanthrene from the quantitative evaluation is unlikely to underestimate the potential non-cancer impacts associated with ingestion of shellfish from Allen Harbor.

Although 4-nitrophenol is identified as a COC in ground water, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). 4-Nitrophenol was detected at 0.001 to 0.003 mg/l in ground water (mean of 0.016 mg/l). Although there are no toxicity criteria for this or structurally similar constituents, the frequency of detection (2/27) and detected concentrations of 4-nitrophenol are relatively low. Further, the detected and mean concentrations of

4-nitrophenol in ground water are less than EPA's lifetime health advisory for this constituent of 0.06 mg/l (EPA, 1993d). Thus, the exclusion of 4-nitrophenol is unlikely to underestimate the potential health impacts associated with exposures to ground water.

- Pesticides/PCBs

Although endosulfan sulfate is identified as a COC in surface soil, EPA toxicity criteria are not available for this constituent (EPA, 1993a,b). Endosulfan sulfate was detected in surface soil at 6.2E-04 to 0.033 mg/kg (mean of 0.011 mg/kg). Based on structure-activity relationships and best professional judgement, the toxicity of endosulfan sulfate is assumed similar to endosulfan. Although the mean and maximum concentrations for endosulfan sulfate in surface soil exceed those for endosulfan, the non-cancer HQs for endosulfan in surface soil are well below 1E+00 (in the range of 9E-06 to 6E-05). For this reason, it is unlikely that exclusion of endosulfan sulfate from the quantitative HHRA contributes to an underestimation of the potential non-cancer impacts associated with exposures to surface soil.

Although endrin aldehyde and endrin ketone are identified as COCs in surface soil, EPA toxicity criteria are not available for these constituents (EPA, 1993a,b). These COCs are metabolites of the parent compound endrin and, based on best professional judgement, are assumed to exhibit similar toxicity as endrin. Endrin aldehyde was detected in surface soil at 4.5E-04 to 0.11 mg/kg (mean of 0.0053 mg/kg), while endrin ketone was detected in surface soil at 3E-04 to 0.057 mg/kg (mean of 0.012 mg/kg). Although the maximum concentration of endrin aldehyde and the mean and maximum concentrations of endrin ketone in surface soil exceed those for endrin, the non-cancer HQs for endrin in surface soil are sufficiently low (in the range of 7E-06 to 2E-05) such that the concentrations of endrin aldehyde and endrin ketone in surface soil are not likely to be of concern. That is, it is unlikely that exclusion of endrin aldehyde and endrin ketone from the quantitative HHRA contributes to an underestimation of the potential non-cancer impacts associated with exposures to surface soil.

- Inorganics

Although aluminum is identified as a COC in surface soil, subsurface soil, ground water, and surface water, there are no toxicity values established for aluminum by the EPA (1993a,b). Aluminum, which is one of the most abundant metals in the earth's crust and is ubiquitous in air, water, and soil, was detected at 2,400 to 38,000 mg/kg in surface soil (mean of 5,700 mg/kg), 3,000 to 18,000 mg/kg in subsurface soil (mean of 6,000 mg/kg), 0.044 to 38 mg/l in ground water (mean of 0.36 mg/l), and 0.34 mg/l in surface water (mean of 0.37 mg/l). Comparison of the aluminum concentrations in surface soil and subsurface soil to the maximum NCBC Davisville background soil concentration (8,560 mg/kg) indicates that 5/41 of the surface soil samples and 3/20 of the subsurface soil concentrations exceed NCBC Davisville background. These aluminum concentrations are also compared to the range of aluminum concentrations at eastern U.S. background locations (USGS, 1984) of 7 to 100,000 mg/kg. This comparison indicates that aluminum levels in on-site surface and subsurface soil are within the range for the eastern U.S. No health-based criteria were identified to evaluate the concentrations of aluminum detected in ground water or surface water. Based on the abundance of aluminum in environmental media, it is unlikely that the exclusion of aluminum from the quantitative risk evaluation contributes to an underestimation of potential non-cancer impacts for the media discussed above.

Although cobalt is identified as a COC in surface soil, subsurface soil, and ground water, no toxicity values for cobalt have been published by the EPA (1993a,b). Cobalt, which is an essential component of Vitamin B12 and required for the production of red blood cells, was detected at 1.9 to 431 mg/kg in surface soil (mean of 9.4 mg/kg), 2.5 to 26 mg/kg in subsurface soil (mean of 8.9 mg/kg), and 0.0055 to 0.050 mg/l in ground water (mean of 0.010 mg/l). Comparison of the cobalt concentrations in surface soil and subsurface soil to the maximum NCBC Davisville background soil concentration (4.6 mg/kg) indicates that 23/41 of the surface soil samples and 16/20 of the subsurface soil samples exceed NCBC Davisville background. These cobalt concentrations are also compared to cobalt concentrations at eastern U.S. background locations (USGS, 1984) which range up to 70 mg/kg. This comparison indicates that cobalt levels exceed the range for eastern U.S. background in 3/41 of the surface soil samples, while all the subsurface soil samples are within this range. No criteria were identified (e.g., an MCL) to evaluate the concentrations of cobalt detected in on-site ground water. In summary, exclusion of cobalt from the quantitative evaluation is associated with some degree of uncertainty given the lack of toxicity-based criteria.

Although lead is identified as a COC in surface soil, subsurface soil, ground water, and shellfish, EPA has considered it inappropriate to develop toxicity values for inorganic lead (EPA, 1993a,b). However, the health effects of lead include cognitive and motor defects in children, lead-induced anemias, increased susceptibility to viral infections and in chronic adult lead poisoning, peripheral neuropathies. Lead was detected at 3.8 to 8,710 mg/kg in surface soil (mean of 110 mg/kg), 3.4 to 2,130 mg/kg in subsurface soil (mean of 130 mg/kg), 0.0028 to 0.026 mg/l in ground water (mean of 0.0034 mg/l), 0.065 to 4.3 mg/kg in clams (mean of 0.19 mg/kg), 0.25 to 0.61 mg/kg in mussels (mean of 0.45 mg/kg), and 0.11 to 0.25 mg/kg in oysters (mean of 0.17 mg/kg). Comparison of the surface soil and subsurface soil lead concentrations to the maximum NCBC Davisville background soil concentration (53.8 mg/kg) indicates that 25/41 of the surface soil samples and 15/20 of the subsurface soil samples exceed NCBC Davisville background. These lead concentrations are also compared to lead concentrations at eastern U.S. background locations (USGS, 1984) which range up to 300 mg/kg. This background range is exceeded for 15/41 surface soil samples and 7/20 subsurface soil samples. The concentrations of lead in on-site soil are also compared to the soil cleanup level of total lead of 500 to 1,000 mg/kg, proposed in the Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (EPA, 1989c). (Note: It should be emphasized that this soil cleanup level range is issued as part of a guidance document, not a regulation, and is directed to address direct soil contact at residential settings. However, residential areas are not included in the land reuse plan for Site 09 based on the Comprehensive Reuse Plan, Davisville NCBC, Development Reuse Scenarios (September, 1993).) The levels of lead on-site exceed this range in 5/41 surface soil samples and 3/20 subsurface soil samples. In comparison to RIDEM's guidance level of 300 mg/kg for lead in soil, 15/41 surface soil samples and 7/20 subsurface soil samples are potentially elevated. The concentrations of lead in on-site ground water are compared to the drinking water action level for lead of 0.015 mg/l. Lead concentrations in on-site ground water exceed this action level in 2/27 samples. For shellfish, the concentrations of lead in shellfish from Allen Harbor are compared to those for shellfish from reference stations in Narragansett Bay (see Table C-7 in Appendix C). With the exception of the maximum concentration of lead in Allen Harbor clams, the mean and maximum concentrations of lead in Allen Harbor shellfish are similar or less than those for the reference stations. On the basis of this qualitative assessment, it is possible that the exclusion of lead as a COC from the quantitative HHRA contributes to an underestimation of the potential health impacts for the media discussed above.

4.0 UNCERTAINTY ASSESSMENT

4.1 Hazard Identification

The primary sources of uncertainty associated with the hazard identification are the environmental sampling and analysis, and the subsequent selection of COCs. Uncertainties associated with environmental sampling and analysis are discussed in Section 4.3.

The selection of COCs is intended to identify those constituents which are likely to contribute the most to potential health risks. Most of the uncertainty in the COC selection is associated with the uncertainties in the environmental sampling and analysis. For example, while it is reasonable to assume a constituent is not likely to be site-related if it is detected in less than 5% of the samples, it is possible for a sampling program to be unintentionally biased such that the location where a constituent was disposed of was sampled only once. Using a 5% criterion in this situation might result in the exclusion of such a constituent from the HHRA. It is important to note, however, that in most cases hot spots or visually contaminated locations tend to be over-represented rather under-represented in a sampling program. It is also possible for degradation products of site-related constituents to be detected infrequently or in localized areas initially, only to become more widespread over time. Despite these uncertainties, the COC selection process is intended to be conservative with an aim towards being inclusive, rather than limited in nature. Of the 109 constituents detected in one or more on-site media at Site 09, 84 are identified as COCs. Of the 57 constituents detected in surface water or shellfish from Allen Harbor, 41 are selected as COCs.

4.2 Uncertainties Related to Toxicity Information

There are several main sources of uncertainty related to the toxicity information. First, the availability and quality of toxicity data affects the ability of experts to derive toxicity criteria and the quality/certainty of the toxicity criteria that are derived. The exclusion of constituents without toxicity criteria from the HHRA also represents a potential source of uncertainty. Constituents of potential concern at Site 09 for which no EPA (1993a,b) toxicity values are available are identified and discussed qualitatively in Section 3.4.2. As discussed, the exclusion of most of these constituents is unlikely to underestimate the potential cancer risks or non-cancer HIs. For carbazole, dibenzofuran, and cobalt in soil, there is some uncertainty associated with their exclusion as toxicity-based criteria are not available for these or structurally similar constituents. For lead in soil, the potential risks may have been underestimated since the RIDEM guidance level of 300 mg/kg and/or the EPA interim cleanup level of 500 to 1,000 mg/kg are exceeded for a number of samples.

The uncertainty associated with the toxicity values for each constituent contributes to the overall uncertainty in the risk characterization of the site. The possible sources of uncertainty for a given constituent include: the number of available studies, the quality of these studies, the consistency among the study results (e.g., across species, strains, sex and exposure pathways), the plausibility of the biological mechanism, and the existence and nature of a dose-response relationship. The quality of individual studies is influenced by some of these same factors as well as the test species, the dose used, the route of exposure, the length of exposure, and other study design issues (e.g., sample size and statistical power). For example, animal to human extrapolation, high dose to low dose extrapolation, and short-term to long-term extrapolation often introduce considerable uncertainty into the derivation of toxicity values.

An additional source of uncertainty in the toxicity assessment is the use of toxicity values for one constituent for other structurally similar constituents (e.g., PAHs), the use of oral toxicity values to assess the potential risks from inhalation exposures (for all COCs) and from dermal exposures (for cadmium, PCBs, and TCDD), and the use of chronic RfDs for assessing subchronic exposures in the absence of subchronic RfDs. Although the assignment of the benzo(a)pyrene cancer slope factors to other carcinogenic PAH compounds follows current Region I guidance (EPA, 1989b), this approach likely creates a considerable overestimate of risk since benzo(a)pyrene is one of the most potent PAH compounds (Rugen et al., 1989; ICF-Clement, 1987; EPA, 1985). However, cancer risks above 1E-06 were generally estimated for both the benzo(a)pyrene and the TEF approaches. Other cross-assignments from one constituent to another did not result in cancer risks greater than 1E-06 or HQs greater than 1E+00.

For assessing risks from dermal exposures to cadmium, PCBs, and 2,3,7,8-TCDD, the oral toxicity values for these constituents were used. Per EPA (1992c) guidance, the oral slope factor for PCBs was not adjusted since (although the slope factor is intake-based) oral absorption of PCBs is nearly 100%. The oral slope factor for 2,3,7,8-TCDD was adjusted for oral absorption since the slope factors are based on intake rather than absorbed dose and oral absorption is less than 100%. The non-cancer toxicity values for cadmium are already dose-based and were therefore not adjusted. In addition to differences in absorption following ingestion and dermal contact, the toxicity of constituents is also likely to vary depending on other differences (e.g., in metabolism, distribution, elimination) between the oral and dermal exposure routes. Dermal contact with Aroclor-1260 in surface soil under the RME case is the only constituent/pathway combination for which cancer risks above 1E-06 were estimated.

Similar to the use of oral toxicity values to assess dermal exposures, the assignment of oral toxicity values to assess inhalation exposures represents another source of uncertainty in the HHRA. In the absence of inhalation toxicity values for a constituent, the oral values were used provided that they were based on non-contact site effects. Although pathway-specific pharmacokinetic differences may exist, the cross-assignment of slope factors and RfDs from oral to inhalation did not generally result in cancer risks or non-cancer HQs greater than 1E-06 and 1E+00, respectively. The one exception is 1,2-dichloroethane in ground water under Scenario 2 (future recreation).

For assessing subchronic exposures (e.g., construction activities), chronic RfDs were used in the event subchronic RfDs were unavailable. Although this approach is likely to introduce uncertainty into the risk estimates for these shorter-term exposures, it is likely to overestimate rather than underestimate the potential health risks. With the exception of toluene in subsurface soil (Scenario 1 (future construction)), none of these cross-assignments from chronic to subchronic resulted in HQs greater than 1E+00.

4.3 Uncertainties Related to Exposure Assessment

Assumptions are inherent in any assessment of exposure and risk. This section identifies and quantifies to the extent possible the uncertainties associated with the exposure assessment for Site 09. The major areas of uncertainty include the selection of EPCs, selection of current and future land uses, selection of exposure pathways, and the selection of specific exposure parameters.

4.3.1 Environmental Sampling and Analysis

As described previously, soil, ground water, surface water, and shellfish samples were collected and analyzed for a variety of constituents including VOCs, SVOCs, pesticides/PCBs, and inorganics. There are several potential sources of uncertainty associated with the collection and analysis of these samples. First, the list of constituents analyzed for presence in the samples, although fairly comprehensive, may not reflect all of the constituents present at Site 09. Second, the number of samples analyzed within each media (e.g., soil, water) may not be sufficiently large to characterize with high confidence the distribution of constituent concentrations in each medium. Further, the sampling locations may not accurately reflect the range, frequency, and distribution of constituents at the site. This phenomenon could lead to an under- or over-representation of (for example) the frequency and magnitude of hot-spot concentrations. Finally, there are uncertainties associated with the analytical methods and instruments used in the analysis of samples. For example, the values reported as non-detected may actually range from not present up to the value of the SQL. The replacement of non-detects with a value equal to the SQL or one-half the SQL is intended to be reasonably conservative, but could over- or underestimate the actual constituent concentrations present in the environmental media.

The EPA (1988a) model used to estimate the concentrations of particulate-adsorbed constituents in air is also associated with uncertainty. The key model assumptions include the time frame during which dust emissions occur (e.g., during construction work) and the use of a yearly average wind speed. The potential impact of these assumptions will be to underestimate risk if these construction activities occur for a longer period of time than originally estimated or if daily wind speeds exceed the annual average wind speed. Similarly, the risk will be overestimated if the reverse were to occur.

With regard to the EPCs for subsurface soil constituents volatilized into air during construction activities, the key uncertainties relate to the models used to estimate the flux of constituents to the soil surface and the resulting ambient air concentrations. The key model inputs include constituent-specific estimates of diffusivity, and the default values used for soil porosity, density, moisture, and wind speed. The inputs used are intended to be conservative (i.e., health protective), but could over- or under-estimate the actual values and thus the potential exposures and risks.

The model used to estimate the volatilization of chemicals from ground water during showering is based on the Ideal Gas Law and constituent-specific estimates of volatility. The availability and reliability of constituent-specific volatility data introduce uncertainty into the resulting air concentration estimates. Available volatility estimates may under- or overestimate a constituent's actual tendency to volatilize (i.e., move from water into air). The model assumption that equilibrium is achieved between the two media (i.e., water and air) is likely to overestimate the air concentrations while showering in the event equilibrium is not achieved over the course of a 10-minute shower as assumed for Scenario 3 (future recreation).

4.3.2 Current and Future Land Use

Currently, Site 09 covers an area of approximately 15 acres on the western side of Allen Harbor. Future commercial/industrial use (e.g., through conversion of the NCBC Davisville base) is possible, although the Comprehensive Reuse Plan for NCBC Davisville indicates a potential recreational use for this site. The HHRA considers potential risks associated with construction, nearby residents or other people using Site 09 for recreational purposes in the future, and off-site adult residents ingesting shellfish found in Allen Harbor. The selection of recreational/conservation land use at Site 09 is based on the Comprehensive Reuse Plan for NCBC Davisville. None of the NCBC Davisville sites, including Site 09, are targeted for development as residential areas. The selected scenarios are intended to represent the spectrum of reasonably likely land uses, but do not necessarily reflect all theoretically possible exposure scenarios at Site 09. Further, the risks associated with the selected scenarios are conditioned on these land uses occurring.

Historically, Site 09 has been used as a landfill, and the site could conceivably be redeveloped for private industrial or commercial use. However, as indicated, the potential use of the site is likely to be recreational. Consequently, the uncertainty associated with Scenario 2 (future recreation) is expected to be relatively low. The uncertainty associated with Scenario 1 (future construction) at the site, which evaluates the potential risks to workers engaged in construction, excavation, or utility activities is likely to be minimal given the likelihood of these activities in the future (e.g., during the development of a recreational facility). Scenario 3 (future shellfishing) is associated with a considerable degree of uncertainty. Although shellfishing in Allen Harbor is reportedly not allowed, this activity may still occur in the future.

The occurrence of future shellfishing depends on a variety of factors (e.g., continued yield, enforcement/removal of restrictions, etc.).

4.3.3 Exposure Pathways

The HHRA for Site 09 evaluates exposures through ingestion of and dermal contact with surface and subsurface soils, exposures to ground water while showering, exposures to surface water while swimming in Allen Harbor, and exposures through ingestion of shellfish from Allen Harbor. These exposure pathways are intended to be representative of the most likely routes of exposure, but do not necessarily reflect all theoretically possible means of contact between the identified receptors and the environmental media. The risks associated with these exposure pathways are conditioned upon the land uses and exposure routes occurring.

There is additional uncertainty associated with evaluating the risks from the dermal exposure to soil pathway. That is, the assessment has necessarily been limited to three constituents, cadmium, PCBs, and TCDD, which are the only constituents with approved EPA absorption factor values (EPA, 1992c). The fact that other constituents at the site have been excluded from the dermal pathway assessment will likely introduce an underestimation of risk at the site. However, the protocol used in this HHRA follows EPA Region I guidance and avoids the introduction of potentially greater uncertainty associated with the use of published, but not EPA-approved, absorption factors for other constituents.

4.3.4 Exposure Parameter Values

Table 2-8 summarizes the assumptions used to estimate exposure (i.e., soil ingestion rate, exposure frequency, etc.). The exposure estimates produced for each receptor in each scenario are based on numerous variables with varying degrees of uncertainty. This discussion will focus on these parameters, and the associated range of uncertainty. Table 2-8 is separated into those parameters which apply to all scenarios (i.e., global variables), and those which apply specifically to an individual scenario.

- Global Variables (All Scenarios)

Table 2-8 lists the parameters and associated values which are used in each of the scenarios. The body weight range for children/youths (age 2 to 18 years) is derived from EPA (1990a). The actual value used represents a weighted average based on the body weights for each of the intervals within the 2 to 18 year age group. Similarly, for adults (18 to 65 years), a range of body weights is presented, along with the average body weight (70 kg) for the group. While there is a range of body weights for each age group, this exposure parameter is not expected to contribute a significant degree of uncertainty to the assessment.

For the construction scenario, adults are assumed to have an exposure duration of 1 year, which is a reasonable time period for construction on a site. The exposure duration used for the recreational scenario is 16 years (4 years from 2 to 6 years old and 12 years from 6 to 18 years old). This age range is conservative in that children younger than two years are unlikely to spend time playing in a park, while people older than 18 are likely to be much less exposed than area residents who are younger. Finally, the exposure duration used for the shellfishing scenario is 30 years. This estimate corresponds to the 90th percentile for the length of time spent at one residence by home owners (EPA, 1991a) and its use likely overstates the potential risk.

The ranges associated with exposure duration are only large when considering adults. Despite this range, the values used are expected to provide conservative estimates and will likely overstate the potential risk.

Averaging time is the time period over which exposures are averaged. Uncertainty is expected to be minimal for the averaging time used to estimate cancer risk since it equals lifetime duration times 365 d/yr. The non-cancer averaging time equals the exposure duration times 365 d/yr and will therefore be more uncertain given the underlying uncertainty in exposure duration.

The ranges of RAFs for organic and inorganic compounds may vary from no differences in absorption to large differences in absorption. This range is likely to contribute a large degree of uncertainty to the exposure estimates. The values chosen for ingestion and inhalation RAFs are representative for classes of compounds, and are provided by EPA Region I (EPA, 1989b). The values chosen for dermal RAFs for cadmium, PCBs, and TCDD are based on or equivalent to the dermal absorption fractions provided in EPA's (1992c) dermal exposure assessment guidance. For cadmium and PCBs, the absorption values (0.01 for cadmium and 0.06 for PCBs) are used as the RAFs since the oral toxicity values are based on absorbed dose (i.e., cadmium) or the oral absorption is nearly 100% (i.e., PCBs). For TCDD, a dermal RAF of 0.04 is estimated by dividing the dermal absorption value (0.03; EPA, 1992c) by the oral absorption value cited in HEAST (0.75; EPA, 1993b). The dermal RAFs may be associated with less uncertainty than those used for ingestion and inhalation since they are based on constituent-specific information rather than on generalizations about classes or groups of constituents. To estimate dose absorbed by dermal contact with surface water while swimming and dermal contact with ground water while showering, permeability constants (K_p) provided by EPA (1992c) corrected for oral absorption are used.

The soil contact rate established by EPA Region I (EPA, 1989b) is based upon three parameters: soil deposition rate, skin surface area and percent (fraction) exposed. Each of these parameters contains some degree of uncertainty. Soil deposition rate (also known as soil adherence factor) may range from 0.2 to 1.5 mg/cm^2 (EPA, 1992c). The value used by EPA Region I of 0.5 mg/cm^2 was chosen as a reasonable estimate following a literature review (EPA, 1989b). Thus, a three-fold difference exists between the actual value used and the upper-bound estimate of adherence. In this HHRA, a surface area of 4,000 cm^2, the value Region I recommends for activities involving extensive contact with soil, is used for the construction scenario. A surface area of 1,420 cm^2 is used for children/youths aged 2 to 18 years playing at a site, and is based on EPA (1992c) guidance. It assumes that 25% of total body surface area is exposed for 2 to 6 year olds and that 10% is exposed for 6 to 18 year olds. A large degree of uncertainty is associated with both of these values (i.e., soil adherence and surface area), and is dependent on soil type, age, and actual area exposed. For example, the area exposed could theoretically range from zero to the total body surface area. Finally, a factor of 50% is applied to account for the percentage of surface area actually covered with soil (EPA, 1989b). This factor is not likely to contribute much uncertainty to the assessment.

Construction Scenario (Future)

Of the parameters presented in Table 2-8, the modeled ambient dust concentration and the modeled ambient air concentrations of volatiles are expected to contribute the largest degree of uncertainty to the exposure estimates for this scenario. The EPCs available at the site include constituent concentrations in soil and ground water. Since airborne concentrations of constituents (e.g., fugitive dust) were not sampled during the field program, the EPCs for this medium must be modeled. Although it is always more accurate to have sampling data, the use of transport models represents a good faith attempt to estimate unknown values from known ones. Exposure frequency and duration represent additional sources of uncertainty for this scenario.

- Recreational Scenario (Future)

The primary source of uncertainty for this scenario is the characterization of future recreational activities at Site 09. The HHRA conservatively assumes that this site is developed into a park (containing an area for swimming and a recreational facility for showering) with public access to people of all ages. Of the scenario-specific parameter values used in the recreational scenario, the skin surface area of children/youth exposed while swimming/wading, exposure frequency, and exposure time while swimming, ingestion rate of surface water while swimming, and exposure frequency and exposure time while showering are likely to be the largest contributors to uncertainty.

A skin surface area of 12,000 cm^2 is used for children/youths aged 2 to 18 years swimming/showering at Site 09, and is based on EPA (1992c) guidance. It assumes that 100%

of the total body surface area is exposed for the children/youths while swimming/showering (EPA recommends use of 75-100% of total skin area be assumed). The exposure frequency (20 days/year) and exposure time (0.5 hr/d) values used may over- or under-estimate potential risks to recreational swimmers/waders. The reported range for exposure frequency and time for a swimmer is 5 days/year for 0.5 hours/day for an average recreational swimmer to 150 d/yr for 1 hour/day for a person who swims regularly for exercise or competition (EPA, 1992c). For this scenario, the exposure frequency chosen is based on exposure being limited to 2 days/week during the 10 weeks of summer, and is considered reasonable given the regional climate. An exposure time of 0.5 hr/d corresponds to the recommended default value which EPA (1992c) estimates is a reasonable average value for a recreational swimmer. For incidental ingestion of surface water while swimming, an ingestion rate of 50 ml/hr corresponds to a reasonable estimate by EPA (1989a). No estimate of the potential amount of surface water ingested while wading, an exposure pathway expected in the younger children, is available.

Of the specific parameters used in the recreational showering pathway, exposure frequency (20 d/yr) and exposure time (0.16 hr/d) are likely to be the largest contributors to uncertainty. The exposure frequency was chosen to correspond to the frequency of swimming (2 d/wk during the 10 week summer months). The showering exposure time value of 0.16 hr/d corresponds to the median estimate by EPA (EPA, 1992c) for showering time.

While the overall characterization of site use and associated exposure parameters may be uncertain, the values used are expected to overestimate rather than underestimate potential risks.

- Shellfishing Scenario (Future)

Of the parameters presented in Table 2-8, the ingestion rate used for mussels, clams, and oysters is associated with the greatest degree of uncertainty. This value (1,200 mg/d) is based on an estimated of seafood serving sizes (i.e., 150,000 mg/meal) and Rhode Island survey information on the typical number of hard-shell clam (i.e., quahog) meals per year (i.e., 2.9 meals/year) (both provided by RIDEM in Narragansett Bay Project (n.d.)). Ingestion rates specific to mussels and oysters are not provided in Narragansett Bay Project (n.d.) and are conservatively assumed to equal the one reported for clams. The resulting ingestion rate of 1,200 g/d is three times higher than the alternate clam ingestion rate of 442 mg/d and four times higher than the alternate oyster ingestion rate of 291 mg/d, both as presented by EPA (1990a). The EPA (1990a) values are based on a month long survey which requested consumer information on the type and amount of fish consumed and is believed to represent 94% of the general population. Although an ingestion rate for mussels is not available in EPA (1990a), the value reported for "other shellfish" (13 mg/d) is used as a comparison. The Narragansett Bay Project (n.d.) ingestion for clams (1,200 mg/d) is 92-fold greater than this rate. Although the values for exposure frequency and fraction from the area near Site 09 (350 d/yr and 1, respectively) are likely to be associated with some uncertainty, these values are upper-bound estimates and are likely to overestimate the potential risks.

4.4 Uncertainties Related to Risk Characterization

The uncertainties associated with the risk characterization may be categorized into two groups: those related to the components of the risk estimates (i.e., the estimates of exposure and toxicity) and those inherent in the risk characterization methodologies. The uncertainties associated with the risk characterizations for the site (i.e., discussions of constituents contributing the most to cancer and non-cancer risks) are discussed below.

Uncertainties Associated with Summation of Risks Across Constituents

For the risk estimation of cancer and of chronic non-cancer health effects, risks for all constituents in each pathway have been summed to yield the risk for each pathway. This is a conservative approach since, in general, different constituents do not have the same target organ or mechanism of action. Thus, their toxic effects may be, at least in some cases, independent and not additive. Further, constituents may antagonize one another through competition for enzymes and binding sites, and by inhibition of pathways needed for constituent transport (absorption, cellular uptake, etc.) or metabolic activation. However, it is also possible that certain constituents can be synergistic such as is the case when promotor-type carcinogen greatly enhances the expression of genetic damage induced by a low dose of an initiator.

Uncertainties Associated with Constituents with Cancer Risks Above 1E-06

Cancer risks were elevated above 1E-06 for at least one exposure pathway in each of the three scenarios. The constituents for which cancer risks above 1E-06 were estimated include:

- Arsenic in surface soil (Scenario 2 (future recreation)), subsurface soil (Scenario 1 (future construction)), and shellfish (Scenario 3 (future shellfishing)),

  Beryllium in surface soil (Scenario 2 (future recreation)), and subsurface soil (Scenario 1 (future construction)),

  1,2-Dichloropropane, trichloroethene, and vinyl chloride in ground water (Scenario 2 (future recreation)), Carcinogenic PAHs in surface soil (Scenario 2 (future recreation)) and subsurface soil (Scenario 1 (future construction)),

- TCDD in surface soil (Scenario 2 (future recreation)),

- Aroclor-1260 in surface soil (Scenario 2 (future recreation)), and Aroclor-1254 in shellfish (Scenario 3 (future shellfishing)).

The uncertainties associated with these individual COCs are discussed below.

Cancer risks above 1E-06 were estimated for incidental ingestion of arsenic in surface soil under Scenario 2 (future recreation), incidental ingestion of subsurface soil under Scenario 1 (future construction), and ingestion of shellfish (clams, mussels, and oysters) from Allen Harbor under Scenario 3 (future shellfishing). Arsenic was detected at a frequency of 34/41 and 20/20 in surface soil and subsurface soil, respectively. Arsenic concentrations exceeded NCBC Davisville background levels in only 6/41 surface soil and 2/20 subsurface soil samples. Thus, although arsenic in soil appears to widespread at Site 09, the concentrations are not unlike natural conditions, and the uncertainty associated with arsenic-related cancer risks may be large. In addition, the cancer risks for arsenic in surface and subsurface soil only exceed 1E-06 under the RME (maximum concentration-based) case. This approach assumes the receptor(s) only comes in contact with the maximum detected concentration and likely overstates the potential exposures and risks. Arsenic was detected in all samples of clams (28/28), mussels (20/20), and oysters (3/3) collected or deployed in Allen Harbor. Similarly, arsenic was detected in all samples of clams, mussels, and oysters collected or deployed in Narragansett Bay. Mean arsenic concentrations in shellfish collected from Allen Harbor are lower than mean arsenic concentrations in shellfish collected or deployed in Narragansett Bay. Maximum arsenic concentrations in clams and oysters (but not in mussels) were also lower in Allen Harbor samples versus Narragansett Bay. Thus, the uncertainty associated with elevated cancer risks from ingestion of shellfish from Allen Harbor is likely to be large, as arsenic concentrations in shellfish are lower or similar to the reference sample locations in Narragansett Bay. Another source of uncertainty is the small dataset for shellfish samples collected near the Allen Harbor Landfill which precludes an evaluation of whether and to what extent the cancer risks estimated for Allen Harbor may be site-related. The oral slope factor for arsenic is not a major source of uncertainty since it is based on long-term human exposures to arsenic in drinking water. Finally, use of alternate ingestion rates (EPA, 1990a) results in cancer risks for arsenic in mussels and oysters that are less than or equal to the target value. For arsenic in clams, the cancer risks are decreased by roughly 3-fold, but still exceed 1E-06. This highlights the uncertainty associated with the reported cancer risks based on the ingestion rate reported in Narragansett Bay Project (n.d.), and suggests ranges of cancer risks that may provide better representations of the potential cancer risks for these pathways.

Beryllium was detected at a frequency of 32/41 and 16/20 in surface soil and subsurface soil, respectively. Beryllium concentrations exceeded NCBC Davisville background levels in 24/41 surface soil and 14/20 subsurface soil samples. Although there appears to be little uncertainty that beryllium levels in soil at Site 09 are elevated and widespread, the cancer risks for beryllium in surface and subsurface soil only exceed 1E-06 under the RME (maximum concentration-based) case. This approach assumes the receptor(s) only comes in contact with the maximum detected concentration and likely overstates the potential exposures and risks. The oral slope factor for beryllium is derived from a drinking water study in rats and is associated with the uncertainty typical of animal-based toxicity values.

Three VOCs (1,2-dichloropropane, trichloroethene, and vinyl chloride) in ground water were associated with cancer risks above 1E-06 for the inhalation of volatiles while showering pathway under Scenario 2 (future recreation). 1,2-Dichloropropane was detected at a frequency of 3/27 at concentrations ranging from 0.002 to 0.94 mg/l (mean of 0.011 mg/l). Trichloroethene was detected at a frequency of 7/27 at concentrations ranging from 0.001 to 1.2 mg/l (mean of 0.01 mg/l). Vinyl chloride was detected at a frequency of 7/27 at concentrations ranging from 0.003 to 7 mg/l (mean of 0.014 mg/l). A general source of uncertainty for all three VOCs is the estimation of cancer risks above 1E-06 under the RME (maximum concentration-based) case only. This approach assumes the receptor(s) only comes in contact with the maximum detected concentration and likely overstates the potential exposures and risks. The maximum detected concentrations for these three VOCs exceed the next highest concentration as follows; 4-fold for 1,2-dichloropropane, 16-fold for trichloroethene, and 280-fold for vinyl chloride. With regard to toxicity, the inhalation cancer risks for 1,2-dichloropropane are associated with the greatest degree of uncertainty since the risk estimates are based on the oral slope factor for this constituent. The oral slope factor for 1,2-dichloropropane, which is based on a gavage study in mice, was cross-assigned to inhalation in the absence of an inhalation slope factor. The inhalation slope factor for vinyl chloride is based on an inhalation rat study, while the basis of the inhalation slope factor for trichloroethene is not known (i.e., not provided in EPA, 1992d). Thus, the slope factors used for 1,2-dichloropropane and vinyl chloride are also associated with uncertainties typical of animal-based toxicity values. A final source of uncertainty is the model used to estimate the concentrations of those VOCs in the air while showering. As discussed in Section 4.3.1, there is no HHRA-related EPA guidance for such estimations and the calculated air concentrations may result in over- or underestimations of the potential exposures and risks for this pathway.

Cancer risks above 1E-06 were estimated for incidental ingestion of carcinogenic PAHs in surface soil under Scenario 2 (future recreation) and in subsurface soil under Scenario 1 (future construction). In surface soil, individual carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b/k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) were detected at frequencies of 60% or greater at sample concentrations ranging from 0.042 to 110 mg/kg. The detected concentrations of total carcinogenic PAHs in surface soil range from 0.042 to 415 mg/kg, with 19/41 of these total concentrations above the range reported for urban areas (0.6 to 3 mg/kg) and the upper range of typical urban background (1 to 3 mg/kg) (Menzie et al., 1992). In subsurface soil, individual carcinogenic PAHs were also detected at frequencies of 60% or greater at sample concentrations of 0.047 to 41 mg/kg. The detected concentrations of total carcinogenic PAHs in subsurface soil range from 0.56 to 187 mg/kg, with 13/20 of these total concentrations above the ranges cited above for urban areas. Thus, the concentrations of carcinogenic PAHs in surface soil and subsurface soil appear elevated relative to urban background. However, the cancer risks for carcinogenic PAHs in surface and subsurface soil only exceed 1E-06 under the RME (maximum concentration-based) case. This approach assumes the receptor(s) only comes in contact with the maximum detected concentration and likely overstates the potential exposures and risks. An additional uncertainty associated with the cancer risks for carcinogenic PAHs is the use of EPA's slope factor for benzo(a)pyrene for the other carcinogenic PAHs. As discussed in Section 4.2, this approach likely overestimates the potential risks from exposure to carcinogenic PAHs. As illustrated in

Table 3-15, although the use of the toxic equivalency approach rather than the use of the benzo(a)pyrene slope factor for all carcinogenic PAHs reduces the cancer risks for ingestion of surface and subsurface soil by a factor of two, the cancer risks for most of the carcinogenic PAHs still exceed 1E-06. Note that the impact of using the TEFs is only evident for pathways in which carcinogenic PAHs contribute significantly to the pathway risks. The benzo(a)pyrene slope factor is based on a dietary study in mice, and is associated with uncertainties typical of such animal-based assessments.

For 2,3,7,8-TCDD equivalents, cancer risks above 1E-06 were estimated for incidental ingestion of surface soil under Scenario 2 (future recreation). Note that dioxins/furans were not analyzed for presence in the other media at Site 09. Dioxins/furans were detected at a frequency of 5/6 samples at concentrations (expressed in 2,3,7,8-TCDD equivalents) ranging from 2.1E-04 to 2.3E-04 mg/kg (mean of 2.1E-04 mg/kg). Due to the small number of samples, it is difficult to ascertain the extent of contamination of dioxins/furans in surface soil at Site 09. The slope factor for 2,3,7,8-TCDD is based on a dietary study in rats and is associated with uncertainties typical of such animal-based assessments. The EPA weight of evidence classification of 2,3,7,8-TCDD is "B2", probable human carcinogen (sufficient animal evidence and inadequate or no human evidence).

Aroclor-1260 in surface soil is associated with cancer risks above 1E-06 for incidental ingestion and dermal contact under Scenario 2 (future recreation). A key uncertainty is the estimation of cancer risks above 1E-06 only under the RME (maximum concentration-based) case. This approach assumes the receptor(s) only comes in contact with maximum detected concentration and likely overstates the potential exposures and risks. The oral slope factor for

PCBs is based on a dietary study in rats using Aroclor-1260. The uncertainty associated with this slope factor is typical of animal-based toxicity values. An additional source of uncertainty is the cross-assignment of the oral slope factor to dermal. As discussed in Section 4.2, constituents may be more or less toxic through dermal contact than following ingestion. There may also be some uncertainty associated with the dermal RAF based on EPA (1992c) and used in the assessment of dermal exposures and risks.

Aroclor-1254 in shellfish from Allen Harbor is associated with cancer risks above 1E-06 using the maximum detected concentration (clams) or both the mean and the maximum concentrations (mussels and oysters). The maximum detected concentrations of this PCB were detected in a harbor sample, away from the Allen Harbor landfill site. In addition, the number of shellfish samples collected near the landfill is small. Thus, the uncertainty associated with the site-related nature of the estimated exposures and risks may be large. Concentrations of Aroclor-1254 were higher in shellfish samples collected or deployed in Allen Harbor versus those obtained from Narragansett Bay. While this indicates a potential local source of contamination, it is unclear if the Allen Harbor landfill serves as the source (or a source) of this contamination. Note that Aroclor-1254 was not selected as a COC for on-site media (i.e., soil) at Site 09. As indicated above for Aroclor-1260, the oral slope factor for PCBs is associated with uncertainties typical of animal-based assessments. Finally, use of alternate ingestion rates (EPA, 1990a) results in cancer risks for Aroclor-1254 that are less than the target value for clams, mussels, and oysters. This highlights the uncertainty associated with the reported cancer risks based on the ingestion rate reported in Narragansett Bay Project (n.d.), and suggests a range of cancer risks that may provide a better representation of the potential cancer risks for this pathway.

Uncertainties Associated with Constituents with HQs Above 1E+00

HIs were elevated above 1E+00 for one or more exposure pathways in Scenario 1 (future construction) and Scenario 2 (future recreation). Constituents associated with HQs above 1E+00 include:

- 1,2-Dichloroethene in ground water (Scenario 2 (future recreation)), and
- Toluene in subsurface soil (Scenario 1 (future construction)).

A discussion of the uncertainties associated with these constituents follows.

An HQ above 1E+00 was estimated for inhalation of 1,2-dichloroethene while showering under Scenario 2 (future recreation). 1,2-Dichloroethene (total) was detected in ground water at a frequency of 15/27. In general, the detected concentrations were low with the exception of a concentration of 28 mg/l in well 09-MW7D. This is evidenced by an HQ above 1E+00 associated only with the use of the maximum detected concentration. The next highest concentration was 0.51 mg/l which is 55-fold less than the maximum. Use of the maximum detected concentration assumes the receptor(s) only comes in contact with this maximum concentration and likely overstates the potential exposures and risks. Another uncertainty is the model used to estimate the concentration of 1,2-dichloroethene in ambient air. As discussed in Section 4.3.1, there is no HHRA-related guidance for such estimations and the estimated air concentrations may over- or underestimate the potential exposures and risks for this pathway. With regard to toxicity, some uncertainty is associated with the use of the oral RfD to assess the potential risks from inhalation exposures. In the absence of an inhalation RfD, the oral RfD, based on a two-year drinking water study in rats, was cross-assigned to inhalation. This oral RfD incorporates an uncertainty factor of 1,000 and is associated with uncertainties typical of such animal-based assessments.

For toluene, an HQ above 1E+00 was estimated for inhalation of volatiles from subsurface soil under Scenario 1 (future construction). A key uncertainty is the estimation of an HQ above 1E+00 only for the RME (maximum concentration-based) case. This approach assumes the receptor(s) only comes in contact with the maximum detected concentration and likely overstates the potential exposures and risks. The next highest concentration (0.004 mg/kg) is six orders of magnitude less than the maximum. Another uncertainty is the model used to estimate the concentration of toluene in ambient air. As discussed in Section 4.3.1, there is no HHRA-related guidance for such estimations and the estimated air concentrations may over- or underestimate the potential exposures and risks for this pathway. With regard to toxicity, the HQs for toluene are based on the chronic inhalation RfD for this constituent. In the absence of a subchronic inhalation RfD, the chronic value was cross-assigned to subchronic. This approach likely overestimates the potential risks from subchronic exposures to toluene during construction activities. The chronic inhalation RfD is based on human exposure data and incorporates an uncertainty factor of 300.

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TABLES

LIST OF TABLES

LIST OF TABLES
(Continued)

TABLE 2-1
SUMMARY OF BACKGROUND DATA FOR INORGANICS IN SURFACE SOIL
NCBC – DAVISVILLE

	Range of Concentrations at NCBC Background Locations (a) (mg/kg)	Range of Concentrations at Eastern U.S. Background Locations (b) (mg/kg)
INORGANICS		
Aluminum	1,170–8,560	7–100,000
Antimony	ND	ND–8.8
Arsenic	0.59–8.1	ND–73
Barium	5.6–15.5	10–1,500
Beryllium	ND–0.66	ND–7
Cadmium	ND–0.46	NA
Calcium	62.7–628	100–280,000
Chromium	3.5–9.6	1–1,000
Cobalt	ND–4.6	ND–70
Copper	3.9–15	ND–700
Cyanide	ND	NA
Iron	3,810–12,000	100–100,000
Lead	3.4–53.8	ND–300
Magnesium	325–1,220	50–50,000
Manganese	21.8–150	ND–7,000
Mercury	ND–0.03	ND–3.4
Nickel	ND–5	ND–700
Potassium	145–728	50–37,000
Selenium	ND–0.77	ND–3.9
Silver	ND–0.08	NA
Sodium	ND–119	ND–50,000
Thallium	ND	NA
Vanadium	3.3–24.6	ND–300
Zinc	10.3–172	ND–2,900

NA = Not available
ND = Not detected
(a) Collected from unimpacted areas at or near Sites 02, 03, 05, 06, and 07 (data provided in Appendix C, Table C–1)
(b) U.S.G.S (1984)

TABLE 2-2
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH CARCINOGENIC EFFECTS: ORAL
NCBC DAVISVILLE – SITE 09

CONSTITUENT	SLOPE FACTOR (SF) ORAL $(mg/kg-day)^{-1}$	WEIGHT-OF-EVIDENCE CLASS	TYPE OF CANCER	SF BASIS/ SOURCE
VOLATILES				
Acetone	NA	D		NA/IRIS,HEAST
Benzene	2.9E-02	A	Leukemia	Occupational/IRIS
Butanone, 2-	NA	D		NA/IRIS,HEAST
Carbon disulfide	NA			NA/IRIS,HEAST
Chlorobenzene	NA	D		NA/IRIS,HEAST
Chloroform	6.1E-03	B2	Kidney	Water/IRIS
Dichloroethane, 1,2-	9.1E-02	B2	Multiple	Gavage/IRIS
Dichloroethene, 1,2- (Total)	NA			NA/IRIS,HEAST
Dichloropropane, 1,2-	6.8E-02	B2	Liver	Gavage/HEAST
Ethylbenzene	NA	D		NA/IRIS,HEAST
Tetrachloroethane, 1,1,2,2-	2.0E-01	C	Liver	Gavage/IRIS
Tetrachloroethene	5.2E-02	B2/C		US EPA
Toluene	NA	D		NA/IRIS,HEAST
Trichloroethane, 1,1,1-	NA	D		NA/IRIS,HEAST
Trichloroethene	1.1E-02	B2/C		US EPA
Vinyl chloride	1.9E+00	A	Lung, liver	Diet/HEAST
Xylene (total)	NA	D		NA/IRIS,HEAST
SEMIVOLATILES				
Acenaphthene	NA	D		NA/IRIS,HEAST
Acenapthtylene	NA			NA/IRIS,HEAST
Anthracene	NA	D		NA/IRIS,HEAST
Benzoic acid	NA	D		NA/IRIS,HEAST
Benzotriazole	NA			NA/IRIS,HEAST
Benzotriazole, chlorinated	NA			NA/IRIS,HEAST
Benzo(a)anthracene (a)	7.3E+00	B2	Forestomach	Diet/IRIS
Benzo(a)pyrene	7.3E+00	B2	Forestomach	Diet/IRIS
Benzo(b)fluoranthene (a)	7.3E+00	B2	Forestomach	Diet/IRIS
Benzo(e)pyrene	NA			NA/IRIS,HEAST
Benzo(g,h,i)perylene	NA	D		NA/IRIS,HEAST
Benzo(k)fluoranthene (a)	7.3E+00	B2	Forestomach	Diet/IRIS
Bis(2-chloroethyl)ether	1.1E+00	B2	Liver	Gavage/IRIS
Bis(2-chloroisopropyl)ether	7.0E-02	C	Liver, lung	Gavage/HEAST
Bis(2-ethylhexyl)phthalate	1.4E-02	B2	Liver	Diet/IRIS
Butylbenzylphthalate	NA	C	Leukemia	Diet/IRIS
Carbazole	NA			NA/IRIS,HEAST
Chrysene (a)	7.3E+00	B2	Forestomach	Diet/IRIS
Coronene	NA			NA/IRIS,HEAST
Dibenzofuran	NA	D		NA/IRIS,HEAST
Dibenz(a,h)anthracene (a)	7.3E+00	B2	Forestomach	Diet/IRIS
Dichlorobenzene, 1,2-	NA	D		NA/IRIS,HEAST
Dichlorobenzene, 1,4-	2.4E-02	B2	Liver	Gavage/HEAST
Diethyl phthalate	NA	D		NA/IRIS,HEAST
Dimethylphenol, 2,4-	NA			NA/IRIS,HEAST
Di-n-butyl phthalate	NA	D		NA/IRIS,HEAST
Fluoranthene	NA	D		NA/IRIS,HEAST
Fluorene	NA	D		NA/IRIS,HEAST
Indeno(1,2,3-cd)pyrene (a)	7.3E+00	B2	Forestomach	Diet/IRIS
Methylnaphthalene, 2-	NA			NA/IRIS,HEAST
Methylphenol, 2-	NA	C		NA/IRIS,HEAST
Methylphenol, 4-	NA	C		NA/IRIS,HEAST
Naphthalene	NA	D		NA/IRIS,HEAST
Nitrophenol, 4-	NA			NA/IRIS,HEAST
Perylene	NA			NA/IRIS,HEAST
Phenanthrene	NA	D		NA/IRIS,HEAST
Phenol	NA	D		NA/IRIS,HEAST
Pyrene	NA	D		NA/IRIS,HEAST
TCDD, 2,3,7,8-	1.5E+05	B2	Respiratory System; Liver	Diet/HEAST

TABLE 2-2 (cont.)
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH CARCINOGENIC EFFECTS: ORAL
NCBC DAVISVILLE – SITE 09

CONSTITUENT	SLOPE FACTOR (SF) ORAL $(mg/kg-day)^{-1}$	WEIGHT-OF EVIDENCE CLASS	TYPE OF CANCER	SF BASIS/ SOURCE
PESTICIDES / PCBs				
Aldrin	1.7E+01	B2	Liver	Diet/IRIS
BHC, alpha-	6.3E+00	B2	Liver	Diet/IRIS
BHC, beta-	1.8E+00	C	Liver	Diet/IRIS
BHC, gamma-	1.3E+00	B2/C	Liver	Diet/HEAST
Chlordane, alpha- (b)	1.3E+00	B2	Liver	Diet/IRIS
Chlordane, gamma- (b)	1.3E+00	B2	Liver	Diet/IRIS
DDD, 4,4-	2.4E-01	B2	Liver	Diet/IRIS
DDE, 4,4-	3.4E-01	B2	Liver	Diet/IRIS
DDT, 4,4-	3.4E-01	B2	Liver	Diet/IRIS
Dieldrin	1.6E+01	B2	Liver	Diet/IRIS
Endosulfan II	NA			NA/IRIS,HEAST
Endosulfan sulfate	NA			NA/IRIS,HEAST
Endrin	NA	D		NA/IRIS,HEAST
Endrin aldehyde	NA			NA/IRIS,HEAST
Endrin ketone	NA			NA/IRIS,HEAST
Heptachlor	4.5E+00	B2	Liver	Diet/IRIS
Heptachlor epoxide	9.1E+00	B2	Liver	Diet/IRIS
Hexachlorobenzene	1.6E+00	B2	Liver	Diet/IRIS
Methoxychlor, p,p'-	NA	D		NA/IRIS,HEAST
Aroclor-1242 (c)	7.7E+00	B2	Liver	Diet/IRIS
Aroclor-1254 (c)	7.7E+00	B2	Liver	Diet/IRIS
Aroclor-1260 (c)	7.7E+00	B2	Liver	Diet/IRIS
INORGANICS				
Aluminum	NA			NA/IRIS,HEAST
Antimony	NA	D		NA/IRIS,HEAST
Arsenic (d)	1.8E+00	A	Skin	Water/IRIS
Barium	NA			NA/IRIS,HEAST
Beryllium	4.3E+00	B2	Multiple Sites	Water/IRIS
Cadmium	NA			NA/IRIS,HEAST
Chromium III	NA			NA/IRIS,HEAST
Chromium VI	NA	A		NA/IRIS,HEAST
Cobalt	NA			NA/IRIS,HEAST
Copper	NA	D		NA/IRIS,HEAST
Cyanide	NA	D		NA/IRIS,HEAST
Lead	NA	B2	Kidney	Oral/IRIS
Manganese	NA	D		NA/IRIS,HEAST
Mercury	NA	D		NA/IRIS,HEAST
Nickel	NA			NA/IRIS,HEAST
Selenium	NA	D		NA/IRIS,HEAST
Silver	NA	D		NA/IRIS,HEAST
Thallium	NA	D		NA/IRIS,HEAST
Vanadium	NA			NA/IRIS,HEAST
Zinc	NA			NA/IRIS,HEAST

IRIS = U.S. EPA, 1993 (or most recent file), Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA (ECAO), 1993, Health Effects Assessment Summary Tables (HEAST): Annual Update
US EPA = US EPA (ORD/ECAO), 1992d, Fax from J.S. Dollarhide to K. Michelson, TRC, re. PERC and TCE slope factors, May 20
NA = Toxicity value not available

(a) Cancer slope factor for benzo(a)pyrene
(b) Cancer slope factor for "chlordane" (CAS No. 57-74-9)
(c) Cancer slope factor for polychlorinated biphenyls (PCBs)
(d) Estimated from unit risk of 5×10^{-5} $(ug/l)^{-1}$

TABLE 2-3
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH CARCINOGENIC EFFECTS: INHALATION
NCBC DAVISVILLE - SITE 09

CONSTITUENT	SLOPE FACTOR (SF) INHALATION (mg/kg-day)$^{-1}$	WEIGHT-OF EVIDENCE CLASS	TYPE OF CANCER	SF BASIS/ SOURCE
VOLATILES				
Acetone	NA	D		NA/IRIS,HEAST
Benzene	2.9E-02	A	Leukemia	Occupational/IRIS
Butanone, 2-	NA	D		NA/IRIS,HEAST
Carbon disulfide	NA			NA/IRIS,HEAST
Chlorobenzene	NA			NA/IRIS,HEAST
Chloroform	8.1E-02	B2	Liver	Gavage/IRIS
Dichloroethane, 1,2-	9.1E-02	B2	Circulatory system	Gavage/IRIS,HEAST
Dichloroethene, 1,2- (Total)	NA			NA/IRIS,HEAST
Dichloropropane, 1,2- (a)	6.8E-02	B2	Liver	Gavage/HEAST
Ethylbenzene	NA	D		NA/IRIS,HEAST
Tetrachloroethane, 1,1,2,2-	2.0E-01	C	Liver	Gavage/IRIS,HEAST
Tetrachloroethene	2.0E-03	B2/C		US EPA
Toluene	NA	D		NA/IRIS,HEAST
Trichloroethane, 1,1,1-	NA	D		NA/IRIS,HEAST
Trichloroethene	6.0E-03	B2/C		US EPA
Vinyl chloride	3.0E-01	A	Liver	HEAST
Xylene (total)	NA	D		NA/IRIS,HEAST
SEMIVOLATILES				
Acenaphthene	NA	D		NA/IRIS,HEAST
Acenaphthylene	NA			NA/IRIS,HEAST
Anthracene	NA	D		NA/IRIS,HEAST
Benzoic acid	NA	D		NA/IRIS,HEAST
Benzotriazole	NA			NA/IRIS,HEAST
Benzotriazole, chlorinated	NA			NA/IRIS,HEAST
Benzo(a)anthracene	NA	B2		NA/IRIS,HEAST
Benzo(a)pyrene	NA	B2		NA/IRIS,HEAST
Benzo(b)fluoranthene	NA	B2		NA/IRIS,HEAST
Benzo(e)pyrene	NA			NA/IRIS,HEAST
Benzo(g,h,i)perylene	NA	D		NA/IRIS,HEAST
Benzo(k)fluoranthene	NA	B2		NA/IRIS,HEAST
Bis(2-chloroethyl)ether	1.1E+00	B2	Liver	Gavage/IRIS,HEAST
Bis(2-chloroisopropyl)ether	3.5E-02	C	Lung, Liver	Gavage/HEAST
Bis(2-ethylhexyl)phthalate (a)	1.4E-02	B2	Liver	Diet/IRIS
Butylbenzylphthalate	NA	C		NA/IRIS,HEAST
Carbazole	NA			NA/IRIS,HEAST
Chrysene	NA	B2		NA/IRIS,HEAST
Coronene	NA			NA/IRIS,HEAST
Dibenzofuran	NA	D		NA/IRIS,HEAST
Dibenz(a,h)anthracene	NA	B2		NA/IRIS,HEAST
Dichlorobenzene, 1,2-	NA	D		NA/IRIS,HEAST
Dichlorobenzene, 1,4-	NA			NA/IRIS,HEAST
Diethyl phthalate	NA	D		NA/IRIS,HEAST
Dimethylphenol, 2,4-	NA			NA/IRIS,HEAST
Di-n-butyl phthalate	NA	D		NA/IRIS,HEAST
Fluoranthene	NA	D		NA/IRIS,HEAST
Fluorene	NA	D		NA/IRIS,HEAST
Indeno(1,2,3-cd)pyrene	NA	B2		NA/IRIS,HEAST
Methylnaphthalene, 2-	NA			NA/IRIS,HEAST
Methylphenol, 2-	NA	C		NA/IRIS,HEAST
Methylphenol, 4-	NA	C		NA/IRIS,HEAST
Naphthalene	NA	D		NA/IRIS,HEAST
Nitrophenol, 4-	NA			NA/IRIS,HEAST
Perylene	NA			NA/IRIS,HEAST
Phenanthrene	NA	D		NA/IRIS,HEAST
Phenol	NA	D		NA/IRIS,HEAST
Pyrene	NA	D		NA/IRIS,HEAST
TCDD, 2,3,7,8-	1.5E+05	B2	Respiratory System; Liver	Diet/HEAST

TABLE 2-3 (cont.)
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH CARCINOGENIC EFFECTS: INHALATION
NCBC DAVISVILLE - SITE 09

CONSTITUENT	SLOPE FACTOR (SF) INHALATION (mg/kg-day)$^{-1}$	WEIGHT-OF EVIDENCE CLASS	TYPE OF CANCER	SF BASIS/ SOURCE
PESTICIDES / PCBs				
Aldrin	1.7E+01	B2	Liver	Diet/IRIS,HEAST
BHC, alpha-	6.3E+00	B2	Liver	Diet/IRIS,HEAST
BHC, beta-	1.8E+00	C	Liver	Diet/IRIS,HEAST
BHC, gamma- (a)	1.3E+00	B2/C	Liver	Diet/HEAST
Chlordane, alpha- (b)	1.3E+00	B2	Liver	Diet/IRIS,HEAST
Chlordane, gamma- (b)	1.3E+00	B2	Liver	Diet/IRIS,HEAST
DDD, 4,4- (a)	2.4E-01	B2	Liver	Diet/IRIS
DDE, 4,4- (a)	3.4E-01	B2	Liver	Diet/IRIS
DDT, 4,4-	3.4E-01	B2	Liver	Diet/IRIS,HEAST
Dieldrin	1.6E+01	B2	Liver	Diet/IRIS,HEAST
Endosulfan II	NA			NA/IRIS,HEAST
Endosulfan sulfate	NA			NA/IRIS,HEAST
Endrin	NA	D		NA/IRIS,HEAST
Endrin aldehyde	NA			NA/IRIS,HEAST
Endrin ketone	NA			NA/IRIS,HEAST
Heptachlor	4.5E+00	B2	Liver	Diet/IRIS,HEAST
Heptachlor epoxide	9.1E+00	B2	Liver	Diet/IRIS,HEAST
Hexachlorobenzene	1.6E+00	B2	Liver	Diet/IRIS,HEAST
Methoxychlor, p,p'-	NA	D		NA/IRIS,HEAST
Aroclor-1242 (c)	7.7E+00	B2	Liver	Diet/IRIS
Aroclor-1254 (c)	7.7E+00	B2	Liver	Diet/IRIS
Aroclor-1260 (c)	7.7E+00	B2	Liver	Diet/IRIS
INORGANICS				
Aluminum	NA			NA/IRIS,HEAST
Antimony	NA			NA/IRIS,HEAST
Arsenic	5.0E+01	A	Respiratory Tract	Occupat./IRIS,HEAST
Barium	NA			NA/IRIS,HEAST
Beryllium	8.4E+00	B2	Lung	IRIS,HEAST
Cadmium	6.3E+00	B1	Respiratory Tract	Occupational/IRIS
Chromium III	NA			NA/IRIS,HEAST
Chromium VI	4.1E+01	A	Lung	IRIS,HEAST
Cobalt	NA			NA/IRIS,HEAST
Copper	NA	D		NA/IRIS,HEAST
Cyanide	NA	D		NA/IRIS,HEAST
Lead	NA	B2	Kidney	NA/IRIS,HEAST
Manganese	NA	D		NA/IRIS,HEAST
Mercury	NA	D		NA/IRIS,HEAST
Nickel (d)	8.4E-01	A	Lung and Nasal	IRIS,HEAST
Selenium	NA	D		NA/IRIS,HEAST
Silver	NA	D		NA/IRIS,HEAST
Thallium	NA	D		NA/IRIS,HEAST
Vanadium	NA	D		NA/IRIS,HEAST
Zinc	NA	D		NA/IRIS,HEAST

IRIS = U.S. EPA, 1993 (or most recent file), Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA (ECAO), 1993, Health Effects Assessment Summary Tables (HEAST): Annual Update
US EPA = US EPA (ORD/ECAO), 1992d, Fax from J.S. Dollarhide to K. Michelson, TRC, re. PERC and TCE slope factors, May 20
NA = Toxicity value not available

(a) Oral toxicity value (based on non-contact site tumors) assigned to inhalation.
(b) Cancer slope factor for "chlordane" (CAS No. 57-74-9)
(c) Cancer slope factor for polychlorinated biphenyls (PCBs)
(d) Cancer slope factor for nickel refinery dust

TABLE 2-4
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC CHRONIC EFFECTS: ORAL
NCBC DAVISVILLE – SITE 09

CONSTITUENT	CHRONIC RFD (ORAL) (mg/kg–day)	CONFIDENCE LEVEL	CRITICAL EFFECT	ORAL RFD BASIS/ SOURCE	UNCERTAINTY FACTOR	MODIFYING FACTOR
VOLATILE ORGANICS						
Acetone	1.0E–01	Low	Increased liver and kidney weight	Gavage/IRIS	1000	1
Benzene	NA			NA/IRIS,HEAST		
Butanone, 2–	6.0E–01	Low	Decreased fetal birth weight	Oral/IRIS	3000	1
Carbon disulfide	1.0E–01	Medium	Fetal toxicity/malformations	Oral/IRIS	100	1
Chlorobenzene	2.0E–02	Medium	Liver toxicity	Oral/IRIS	1000	1
Chloroform	1.0E–02	Medium	Liver lesions	Capsule/IRIS	1000	1
Dichloroethane, 1,2–	NA			NA/IRIS,HEAST		
Dichloroethene, 1,2– (Total)	9.0E–03		Liver lesions	Water/HEAST	1000	NA
Dichloropropane, 1,2–	NA			NA/IRIS,HEAST		
Ethylbenzene	1.0E–01	Low	Liver and kidney toxicity	Oral/IRIS	1000	1
Tetrachloroethane, 1,1,2,2–	NA			NA/IRIS,HEAST		
Tetrachloroethene	1.0E–02	Medium	Hepatotoxicity	Gavage/IRIS	1000	1
Toluene	2.0E–01	Medium	Changes in liver and kidney weights	Gavage/IRIS	1000	1
Trichloroethane, 1,1,1–	NA			NA/IRIS,HEAST		
Trichloroethene	NA			NA/IRIS,HEAST		
Vinyl chloride	NA			NA/IRIS,HEAST		
Xylene (total)	2.0E+00	Medium	Hyperactivity,decreased body weight,increased mortality	Gavage/IRIS	100	1
SEMIVOLATILES						
Acenaphthene	6.0E–02	Low	Hepatotoxicity	Gavage/IRIS	3000	1
Acenapthtylene	NA			NA/IRIS,HEAST		
Anthracene	3.0E–01	Low	None observed	Gavage/IRIS	3000	1
Benzoic acid	4.0E+00	Medium	None observed	Diet/IRIS	1	1
Benzotriazole	NA			NA/IRIS,HEAST		
Benzotriazole, chlorinated	NA			NA/IRIS,HEAST		
Benzo(a)anthracene	NA			NA/IRIS,HEAST		
Benzo(a)pyrene	NA			NA/IRIS,HEAST		
Benzo(b)fluoranthene	NA			NA/IRIS,HEAST		
Benzo(e)pyrene	NA			NA/IRIS,HEAST		
Benzo(g,h,i)perylene	NA			NA/IRIS,HEAST		
Benzo(k)fluoranthene	NA			NA/IRIS,HEAST		
Bis(2–chloroethyl)ether	NA			NA/IRIS,HEAST		
Bis(2–chloroisopropyl)ether	NA			NA/IRIS,HEAST		
Bis(2–ethylhexyl)phthalate	2.0E–02	Medium	Increased relative liver weight	Diet/IRIS	1000	1
Butylbenzylphthalate	2.0E–01	Low	Effects on body weight gain, testes,liver,kidney	Diet/IRIS	1000	1
Carbazole	NA			NA/IRIS,HEAST		
Chrysene	NA			NA/IRIS,HEAST		
Coronene	NA			NA/IRIS,HEAST		
Dibenzofuran	NA			NA/IRIS,HEAST		
Dibenz(a,h)anthracene	NA			NA/IRIS,HEAST		
Dichlorobenzene, 1,2–	9.0E–02	Low	No adverse effects	Gavage/IRIS	1000	1
Dichlorobenzene, 1,4–	NA			NA/IRIS,HEAST		
Diethyl phthalate	8.0E–01	Low	Decreased growth rate and food consumption	Diet/IRIS	1000	1
Dimethylphenol, 2,4–	2.0E–02	Low	Clinical signs; hematological changes	Gavage/IRIS	3000	1
Di–n–butyl phthalate	1.0E–01	Low	Increased mortality	Diet/IRIS	1000	1
Fluoranthene	4.0E–02	Low	Kidney, liver, blood, and clinical effects	Gavage/IRIS	3000	1
Fluorene	4.0E–02	Low	Hematological effects	Gavage/IRIS	3000	1
Indeno(1,2,3–cd)pyrene	NA			NA/IRIS,HEAST		
Methylnaphthalene, 2–	NA			NA/IRIS,HEAST		
Methylphenol, 2–	5.0E–02	Medium	Decreased body weight, neurotoxicity	Gavage/IRIS	1000	1
Methylphenol, 4–	5.0E–03		Maternal death	Gavage/HEAST	1000	NA
Naphthalene	4.0E–02		Decreased body weight gain	Gavage/HEAST92	10000	NA
Nitrophenol, 4–	NA			NA/IRIS,HEAST		
Perylene	NA			NA/IRIS,HEAST		
Phenanthrene	NA			NA/IRIS,HEAST		
Phenol	6.0E–01	Low	Reduced fetal body weight	Gavage/IRIS	100	1
Pyrene	3.0E–02	Low	Kidney effects	Gavage/IRIS	3000	1
TCDD, 2,3,7,8–	NA			NA/IRIS,HEAST		

TABLE 2-4 (cont.)
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC CHRONIC EFFECTS: ORAL
NCBC DAVISVILLE – SITE 09

CONSTITUENT	CHRONIC RFD (ORAL) (mg/kg-day)	CONFIDENCE LEVEL	CRITICAL EFFECT	ORAL RFD BASIS/ SOURCE	UNCERTAINTY FACTOR	MODIFYING FACTOR
PESTICIDES / PCBs						
Aldrin	3.0E-05	Medium	Liver toxicity	Diet/IRIS	1000	1
BHC, alpha- (a)	3.0E-04	Medium	Liver and kidney toxicity	Diet/IRIS	1000	1
BHC, beta- (a)	3.0E-04	Medium	Liver and kidney toxicity	Diet/IRIS	1000	1
BHC, gamma-	3.0E-04	Medium	Liver and kidney toxicity	Diet/IRIS	1000	1
Chlordane, alpha- (b)	6.0E-05	Low	Liver hypertrophy	Diet/IRIS	1000	1
Chlordane, gamma- (b)	6.0E-05	Low	Liver hypertrophy	Diet/IRIS	1000	1
DDD, 4,4- (c)	5.0E-04			Diet/IRIS		
DDE, 4,4- (c)	5.0E-04			Diet/IRIS		
DDT, 4,4-	5.0E-04	Medium	Liver lesions	Diet/IRIS	100	1
Dieldrin	5.0E-05	Medium	Liver lesions	Diet/IRIS	100	1
Endosulfan II (d)	6.0E-03		Decreased weight gain; kidney toxicity; aneurysms	Diet/HEAST	100	NA
Endosulfan sulfate	NA			NA/IRIS,HEAST		
Endrin	3.0E-04	Medium	Liver lesions; CNS convulsions	Diet/IRIS	100	1
Endrin aldehyde	NA			NA/IRIS,HEAST		
Endrin ketone	NA			NA/IRIS,HEAST		
Heptachlor	5.0E-04	Low	Increased liver weight	Diet/IRIS	300	1
Heptachlor epoxide	1.3E-05	Low	Increased relative liver weight	Diet/IRIS	1000	1
Hexachlorobenzene	8.0E-04	Medium	Liver toxicity	Diet/IRIS	100	1
Methoxychlor, p,p'-	5.0E-03	Low	Litter loss	Gavage/IRIS	1000	1
Aroclor-1242	NA			NA/IRIS,HEAST		
Aroclor-1254	NA			NA/IRIS,HEAST		
Aroclor-1260	NA			NA/IRIS,HEAST		
INORGANICS						
Aluminum	NA			NA/IRIS,HEAST		
Antimony	4.0E-04	Low	Decreased longevity, blood glucose and cholesterol	Water/IRIS	1000	1
Arsenic	3.0E-04	Medium	Hyperpigmentation, keratosis, possible vascular effects	Water/IRIS	3	1
Barium	7.0E-02	Medium	Increased blood pressure	Water/IRIS	3	1
Beryllium	5.0E-03	Low	None observed	Water/IRIS	100	1
Cadmium (e)	1.0E-03	High	Proteinuria	Diet/IRIS	10	1
Chromium III	1.0E+00	Low	None observed	Diet/IRIS	100	10
Chromium VI	5.0E-03	Low	None observed	Water/IRIS	500	1
Cobalt	NA			NA/IRIS,HEAST		
Copper (f)	3.7E-02		Local gastrointestinal irritation	Oral/HEAST	NA	NA
Cyanide	2.0E-02	Medium	Weight loss, thyroid effects	Diet/IRIS	100	5
Lead	NA			NA/IRIS,HEAST		
Manganese (g)	1.4E-01		Central nervous system effects	Diet/IRIS	1	1
Mercury	3.0E-04		Kidney effects	Oral/HEAST	1000	NA
Nickel (h)	2.0E-02	Medium	Reduced body and organ weight	Diet/IRIS	300	1
Selenium	5.0E-03	High	Clinical selenosis, CNS abnormalities	Diet/IRIS	3	1
Silver	5.0E-03	Low	Dermal effects	I.V./IRIS	3	1
Thallium (i)	8.0E-05	Low	Increased SGOT and LDH levels	Gavage/IRIS	3000	1
Vanadium	7.0E-03		None observed	Water/HEAST	100	NA
Zinc	3.0E-01	Medium	Anemia	Diet/IRIS	3	1

IRIS = U.S. EPA, 1993 (or most recent file), Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA (ECAO), 1993, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA (ECAO), 1992, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per verbal guidance from EPA Region I.
NA = Toxicity value not available

(a) Value for gamma-BHC
(b) Value for "chlordane" (CAS No. 57-74-9)
(c) Value for 4,4'-DDT
(d) Value for "endosulfan" (CAS No. 115-29-7)
(e) Value for food ingestion; RfD for water ingestion is 5E-4 mg/kg-day
(f) Value derived from current drinking water standard of 1.3 mg/l
(g) Value for food ingestion; RfD for water ingestion is 5E-3 mg/kg-day
(h) Value for nickel (soluble salts)
(i) Thallium carbonate; selection based on pH of soils at NCBC Davisville

TABLE 2-5
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC SUBCHRONIC EFFECTS: ORAL
NCBC DAVISVILLE – SITE 09

CONSTITUENT	SUBCHRONIC RFD (ORAL) (mg/kg-day)	CONFIDENCE LEVEL (a)	CRITICAL EFFECT	ORAL RFD BASIS/ SOURCE	UNCERTAINTY FACTOR (b)
VOLATILE ORGANICS					
Acetone	1.0E+00		Increased liver and kidney weights,nephrotoxicity	Gavage/HEAST	100
Benzene	NA			NA/HEAST	
Butanone, 2-	2.0E-01		Decreased birth weight	Water/HEAST	1000
Carbon disulfide	1.0E-01	Medium	Fetal toxicity/malformations	Oral/HEAST	100
Chlorobenzene (c)	2.0E-02	Medium	Liver toxicity	Oral/IRIS	1000
Chloroform	1.0E-02		Liver lesions	Capsule/HEAST	1000
Dichloroethane, 1,2-	NA			NA/HEAST	
Dichloroethene, 1,2- (Total)	9.0E-03		Liver lesions	Water/HEAST	1000
Dichloropropane, 1,2-	NA			NA/HEAST	
Ethylbenzene (c)	1.0E-01	Low	Liver and kidney toxicity	Oral/IRIS	1000
Tetrachloroethane, 1,1,2,2-	NA			NA/HEAST	
Tetrachloroethene	1.0E-01		Hepatotoxicity	Oral/HEAST	100
Toluene	2.0E+00		Changes in liver and kidney weight	Gavage/HEAST	100
Trichloroethane, 1,1,1-	NA			NA/HEAST	
Trichloroethene	NA			NA/HEAST	
Vinyl chloride	NA			NA/HEAST	
Xylene (total) (c)	2.0E+00	Medium	Hyperactivity; decreased body weight; increased mortality	Gavage/IRIS	100
SEMIVOLATILES					
Acenaphthene	6.0E-01		Hepatotoxicity	Gavage/HEAST	300
Acenapthtylene	NA			NA/HEAST	
Anthracene	3.0E+00		None observed	Gavage/HEAST	300
Benzoic acid	4.0E+00		None observed	Diet/HEAST	1
Benzotriazole	NA			NA/HEAST	
Benzotriazole, chlorinated	NA			NA/HEAST	
Benzo(a)anthracene	NA			NA/HEAST	
Benzo(a)pyrene	NA			NA/HEAST	
Benzo(b)fluoranthene	NA			NA/HEAST	
Benzo(e)pyrene	NA			NA/HEAST	
Benzo(g,h,i)perylene	NA			NA/HEAST	
Benzo(k)fluoranthene	NA			NA/HEAST	
Bis(2-chloroethyl)ether	NA			NA/HEAST	
Bis(2-chloroisopropyl)ether	4.0E-02		Decreased hemoglobin	Diet/HEAST	1000
Bis(2-ethylhexyl)phthalate (c)	2.0E-02	Medium	Increased relative liver weight	Diet/IRIS	1000
Butylbenzylphthalate	2.0E+00		Altered liver weight	Diet/HEAST	100
Carbazole	NA			NA/HEAST	
Chrysene	NA			NA/HEAST	
Coronene	NA			NA/HEAST	
Dibenzofuran	NA			NA/HEAST	
Dibenz(a,h)anthracene	NA			NA/HEAST	
Dichlorobenzene, 1,2- (c)	9.0E-02	Low	No adverse effects	Gavage/IRIS	1000
Dichlorobenzene, 1,4-	NA			NA/HEAST	
Diethyl phthalate	8.0E+00		Decreased body and organ weights	Diet/HEAST	100
Dimethylphenol, 2,4-	2.0E-01		Nervous system effects, blood alterations	Gavage/HEAST	300
Di-n-butyl phthalate	1.0E+00		Increased mortality	Diet/HEAST	100
Fluoranthene	4.0E-01		Kidney, liver, and blood effects	Gavage/HEAST	300
Fluorene	4.0E-01		Decreased erythrocyte counts	Gavage/HEAST	300
Indeno(1,2,3-cd)pyrene	NA			NA/HEAST	
Methylnaphthalene, 2-	NA			NA/HEAST	
Methylphenol, 2-	5.0E-01		Neurotoxicity; decreased weight gain	Gavage/HEAST	100
Methylphenol, 4-	5.0E-02		Maternal death; respiratory distress	Gavage/HEAST	100
Naphthalene	4.0E-02		Decreased body weight gain	Gavage/HEAST92	10000
Nitrophenol, 4-	NA			NA/HEAST	
Perylene	NA			NA/HEAST	
Phenanthrene	NA			NA/HEAST	
Phenol	6.0E-01		Reduced fetal body weight	Gavage/HEAST	100
Pyrene	3.0E-01		Renal effects	Gavage/HEAST	300
TCDD, 2,3,7,8-	NA			NA/HEAST	

TABLE 2-6 (cont.)
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC SUBCHRONIC EFFECTS: ORAL
NCBC DAVISVILLE – SITE 09

CONSTITUENT	SUBCHRONIC RFD (ORAL) (mg/kg-day)	CONFIDENCE LEVEL (a)	CRITICAL EFFECT	ORAL RFD BASIS/ SOURCE	UNCERTAINTY FACTOR (b)
PESTICIDES / PCBs					
Aldrin	3.0E-05		Liver lesions	Diet/HEAST	1000
BHC, alpha- (d)	3.0E-03		Liver and kidney toxicity	Diet/HEAST	100
BHC, beta- (d)	3.0E-03		Liver and kidney toxicity	Diet/HEAST	100
BHC, gamma-	3.0E-03		Liver and kidney toxicity	Diet/HEAST	100
Chlordane, alpha- (e)	6.0E-05		Liver hypertrophy	Diet/HEAST	1000
Chlordane, gamma- (e)	6.0E-05		Liver hypertrophy	Diet/HEAST	1000
DDD, 4,4- (f)	5.0E-04		Liver lesions	Diet/HEAST	100
DDE, 4,4- (f)	5.0E-04		Liver lesions	Diet/HEAST	100
DDT, 4,4-	5.0E-04		Liver lesions	Diet/HEAST	100
Dieldrin	5.0E-05		Liver lesions	Diet/HEAST	100
Endosulfan II (g)	6.0E-03		Decreased weight gain; kidney toxicity; aneurysms	Diet/HEAST	100
Endosulfan sulfate	NA			NA/HEAST	
Endrin	3.0E-04		Liver lesions; CNS convulsions	Diet/HEAST	100
Endrin aldehyde	NA			NA/HEAST	
Endrin ketone	NA			NA/HEAST	
Heptachlor	5.0E-04		Increased liver weight	Diet/HEAST	300
Heptachlor epoxide	1.3E-05		Increased relative liver weight	Diet/HEAST	1000
Hexachlorobenzene (c)	8.0E-04	Medium	Liver toxicity	Diet/IRIS	100
Methoxychlor, p,p'-	5.0E-03		Litter loss	Gavage/HEAST	1000
Aroclor-1242	NA			NA/HEAST	
Aroclor-1254	NA			NA/HEAST	
Aroclor-1260	NA			NA/HEAST	
INORGANICS					
Aluminum	NA			NA/HEAST	
Antimony	4.0E-04		Increased mortality; altered blood chemistry	Water/HEAST	1000
Arsenic	3.0E-04		Keratosis and hyperpigmentation	Oral/HEAST	1000
Barium	7.0E-02		Increased blood pressure	Water/HEAST	3
Beryllium	5.0E-03		None observed	Water/HEAST	100
Cadmium (c,h)	1.0E-03		Proteinuria	Diet/IRIS	10
Chromium III	1.0E+00		None observed	Diet/HEAST	1000
Chromium VI	2.0E-02		None observed	Water/HEAST	100
Cobalt	NA			NA/HEAST	
Copper (i)	3.7E-02		Local gastrointestinal irritation	Oral/HEAST	NA
Cyanide	2.0E-02		Decreased body weight, thyroid effects, myelin degeneration	Diet/HEAST	500
Lead	NA			NA/HEAST	
Manganese (j)	1.4E-01		Central nervous system effects	Diet/HEAST	1
Mercury	3.0E-04		Kidney effects	Oral/HEAST	1000
Nickel (k)	2.0E-02		Decreased body and organ weight	Diet/HEAST	300
Selenium	5.0E-03		Clinical selenosis	Diet/HEAST	3
Silver	5.0E-03		Dermal effects	I.V./HEAST	3
Thallium (l)	8.0E-04		Increased SGOT and LDH levels	Gavage/HEAST	300
Vanadium	7.0E-03		None observed	Water/HEAST	100
Zinc	3.0E-01		Anemia	Diet/HEAST	3

HEAST = U.S. EPA (ECAO), 1993, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA (ECAO), 1992, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per verbal guidance from EPA Region I.
NA = Toxicity value not available

(a) Confidence level not specified in HEAST
(b) Modifying factor not specified in HEAST
(c) Subchronic RfD not available, chronic value used.
(d) Value for gamma-BHC
(e) Value for "chlordane" (CAS No. 57-74-9)
(f) Value for 4,4'-DDT
(g) Value for "endosulfan" (CAS No. 115-29-7)
(h) Chronic value for ingestion; Chronic Rfd for ingestion is 5E-4 mg/kg-day
(i) Value derived from current drinking water standard of 1.3 mg/l
(j) Value for food ingestion; RfD for water ingestion is 5E-3 mg/kg-day
(k) Value for nickel (soluble salts)
(l) Thallium carbonate; selection based on pH of soils at NCBC Davisville

TABLE 2-6
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC CHRONIC EFFECTS: INHALATION
NCBC DAVISVILLE - SITE 09

CONSTITUENT	CHRONIC RFD (INHALATION) (mg/kg-day)	CONFIDENCE LEVEL	CRITICAL EFFECT	INHALATION RFD BASIS/ SOURCE	UNCERTAINTY FACTOR	MODIFYING FACTOR
VOLATILES						
Acetone (a)	1.0E-01	Low	Increased liver and kidney weight	Gavage/IRIS	100	1
Benzene	NA			NA/IRIS,HEAST		
Butanone, 2- (b)	2.9E-01	Low	Decreased fetal birth weight	IRIS	1000	3
Carbon disulfide	2.9E-03		Gestation/fetal development	HEAST	1000	
Chlorobenzene	5.0E-03		Kidney and liver effects	HEAST	10000	NA
Chloroform (a)	1.0E-02	Medium	Liver lesions	Capsule/IRIS	1000	1
Dichloroethane, 1,2-	NA			NA/IRIS,HEAST		
Dichloroethene, 1,2- (a)	9.0E-03		Liver lesions	Water/HEAST	1000	NA
Dichloropropane, 1,2- (c)	1.1E-03	Medium	Nasal mucosa hyperplasia	IRIS	300	1
Ethylbenzene (b)	2.9E-01	Low	Developmental toxicity	IRIS	300	1
Tetrachloroethane, 1,1,2,2-	NA			NA/IRIS,HEAST		
Tetrachloroethene (a)	1.0E-02	Medium	Hepatotoxicity	Gavage/IRIS	1000	1
Toluene (d)	1.1E-01	Medium	CNS effects	IRIS	300	1
Trichloroethane, 1,1,1-	NA			NA/IRIS,HEAST		
Trichloroethene	NA			NA/IRIS,HEAST		
Vinyl chloride	NA			NA/IRIS,HEAST		
Xylene (total) (a)	2.0E+00		Hyperactivity, dec. body weight, increased mortality	Gavage/IRIS	100	1
SEMIVOLATILES						
Acenaphthene (a)	6.0E-02	Low	Hepatotoxicity	Gavage/IRIS	3000	1
Acenaphthylene	NA			NA/IRIS,HEAST		
Anthracene (a)	3.0E-01	Low	None observed	Gavage/IRIS	3000	1
Benzoic acid (a)	4.0E+00	Medium	None observed	Diet/IRIS	1	1
Benzotriazole	NA			NA/IRIS,HEAST		
Benzotriazole, chlorinated	NA			NA/IRIS,HEAST		
Benzo(a)anthracene	NA			NA/IRIS,HEAST		
Benzo(a)pyrene	NA			NA/IRIS,HEAST		
Benzo(b)fluoranthene	NA			NA/IRIS,HEAST		
Benzo(e)pyrene	NA			NA/IRIS,HEAST		
Benzo(g,h,i)perylene	NA			NA/IRIS,HEAST		
Benzo(k)fluoranthene	NA			NA/IRIS,HEAST		
Bis(2-chloroethyl)ether	NA			NA/IRIS,HEAST		
Bis(2-chloroisopropyl)ether	NA			NA/IRIS,HEAST		
Bis(2-ethylhexyl)phthalate (a)	2.0E-02	Medium	Increased relative liver weight	Diet/IRIS	1000	1
Butylbenzylphthalate (a)	2.0E-01	Low	Effects on body weight gain, testes, liver, kidney	Diet/IRIS	1000	1
Carbazole	NA			NA/IRIS,HEAST		
Chrysene	NA			NA/IRIS,HEAST		
Coronene	NA			NA/IRIS,HEAST		
Dibenzofuran	NA			NA/IRIS,HEAST		
Dibenz(a,h)anthracene	NA			NA/IRIS,HEAST		
Dichlorobenzene, 1,2- (a)	9.0E-02	Low	None observed	Gavage/IRIS	1000	1
Dichlorobenzene, 1,4- (e)	2.2E-01		Liver	HEAST	100	NA
Diethyl phthalate (a)	8.0E-01	Low	Decreased growth rate and food consumption	Diet/IRIS	1000	1
Dimethylphenol, 2,4- (a)	2.0E-02	Low	Clinical signs; hematological changes	Gavage/IRIS	3000	1
Di-n-butyl phthalate (a)	1.0E-01	Low	Increased mortality	Diet/IRIS	1000	1
Fluoranthene (a)	4.0E-02	Low	Kidney, liver, blood, and clinical effects	Gavage/IRIS	3000	1
Fluorene (a)	4.0E-02	Low	Hematological effects	Gavage/IRIS	3000	1
Indeno(1,2,3-cd)pyrene	NA			NA/IRIS,HEAST		
Methylnaphthalene, 2-	NA			NA/IRIS,HEAST		
Methylphenol, 2- (a)	5.0E-02	Medium	Decreased body weight, neurotoxicity	Gavage/IRIS	1000	1
Methylphenol, 4- (a)	5.0E-03		Maternal death	Gavage/HEAST	1000	NA
Naphthalene (a)	4.0E-02		Decreased body weight gain	Gavage/HEAST92	10000	NA
Nitrophenol, 4-	NA			NA/IRIS,HEAST		
Perylene	NA			NA/IRIS,HEAST		
Phenanthrene	NA			NA/IRIS,HEAST		
Phenol (a)	6.0E-01	Low	Reduced fetal body weight	Gavage/IRIS	100	1
Pyrene (a)	3.0E-02	Low	Kidney effects	Gavage/IRIS	3000	1
TCDD, 2,3,7,8-	NA			NA/IRIS,HEAST		

TABLE 2-6 (cont.)
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC CHRONIC EFFECTS: INHALATION
NCBC DAVISVILLE – SITE 09

CONSTITUENT	CHRONIC RFD (INHALATION) (mg/kg-day)	CONFIDENCE LEVEL	CRITICAL EFFECT	INHALATION RFD BASIS/ SOURCE	UNCERTAINTY FACTOR	MODIFYING FACTOR
PESTICIDES / PCBs						
Aldrin (a)	3.0E-05	Medium	Liver toxicity	Diet/IRIS	1000	1
BHC, alpha-	NA			NA/IRIS,HEAST		
BHC, beta-	NA			NA/IRIS,HEAST		
BHC, gamma- (a)	3.0E-04	Medium	Liver and kidney toxicity	Diet/IRIS	1000	1
Chlordane, alpha- (a,f)	6.0E-05	Low	Liver hypertrophy	Diet/IRIS	1000	1
Chlordane, gamma- (a,f)	6.0E-05	Low	Liver hypertrophy	Diet/IRIS	1000	1
DDD, 4,4-	NA			NA/IRIS,HEAST		
DDE, 4,4-	NA			NA/IRIS,HEAST		
DDT, 4,4- (a)	5.0E-04	Medium	Liver lesions	Diet/IRIS	100	1
Dieldrin (a)	5.0E-05	Medium	Liver lesions	Diet/IRIS	100	1
Endosulfan II (a,g)	6.0E-03		Decreased weight gain; kidney toxicity; aneurysms	Diet/HEAST	100	NA
Endosulfan sulfate	NA			NA/IRIS,HEAST		
Endrin (a)	3.0E-04	Medium	Liver lesions; CNS convulsions	Diet/IRIS	100	1
Endrin aldehyde	NA			NA/IRIS,HEAST		
Endrin ketone	NA			NA/IRIS,HEAST		
Heptachlor (a)	5.0E-04	Low	Increased liver weight	Diet/IRIS	300	1
Heptachlor epoxide (a)	1.3E-05	Low	Increased relative liver weight	Diet/IRIS	1000	1
Hexachlorobenzene (a)	8.0E-04	Medium	Liver toxicity	Diet/IRIS	100	1
Methoxychlor, p,p'- (a)	5.0E-03	Low	Litter loss	Gavage/IRIS	1000	1
Aroclor-1242	NA			NA/IRIS,HEAST		
Aroclor-1254	NA			NA/IRIS,HEAST		
Aroclor-1260	NA			NA/IRIS,HEAST		
INORGANICS						
Aluminum	NA			NA/IRIS,HEAST		
Antimony (a)	4.0E-04	Low	Decreased longevity, blood glucose, and cholesterol	Water/IRIS	1000	1
Arsenic (a)	3.0E-04	Medium	Hyperpigmentation, keratosis, possible vascular effects	Water/IRIS	3	1
Barium	1.0E-04		Fetotoxicity	HEAST	1000	1
Beryllium (a)	5.0E-03	Low	None observed	Water/IRIS	100	1
Cadmium (h)	5.0E-04	High	Proteinuria	Diet/IRIS	10	1
Chromium III (a)	1.0E+00	Low	None observed	Diet/IRIS	100	10
Chromium VI (a)	5.0E-03	Low	No effects reported	Water/IRIS	500	1
Cobalt	NA			NA/IRIS,HEAST		
Copper	NA			NA/IRIS,HEAST		
Cyanide (a)	2.0E-02	Medium	Weight loss, thyroid effects	Diet/IRIS	100	5
Lead	NA			NA/IRIS,HEAST		
Manganese (i)	1.1E-04	Medium	Respiratory symptoms, psychomotor disturbances	Occupat./IRIS	300	3
Mercury (j)	8.6E-05		Neurotoxicity	Occupat./HEAST	30	NA
Nickel (a,k)	2.0E-02	Medium	Reduced body and organ weights	Diet/IRIS	300	1
Selenium	5.0E-03	High	Clinical selenosis, CNS abnormalities	Diet/IRIS	3	1
Silver (a)	5.0E-03	Low	Dermal effects	I.V./IRIS	3	1
Thallium (a,l)	8.0E-05	Low	Increased SGOT and LDH levels	Gavage/IRIS	3000	1
Vanadium (a)	7.0E-03		None observed	Water/HEAST	100	NA
Zinc (a)	3.0E-01		Anemia	Diet/IRIS	3	1

IRIS = U.S. EPA, 1993 (or most recent file), Integrated Risk Information System (IRIS) Database
HEAST = U.S. EPA (ECAO), 1993, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA (ECAO), 1992, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per verbal guidance from EPA Region I.
NA = Toxicity value not available

(a) Oral toxicity value (based on systemic effects) assigned to inhalation.
(b) Value derived from RfC of 1E+00 mg/m3.
(c) Value derived from RfC of 4E-3 mg/m3.
(d) Value derived from RfC of 4E-01 mg/m3.
(e) Value derived from RfC of 8E-1 mg/m3.
(f) Value for "chlordane" (CAS No. 57-74-9)
(g) Value for "endosulfan" (CAS No. 115-29-7)
(h) Oral toxicity value for water ingestion (based on systemic effects) assigned to inhalation
(i) Value derived from RfC of 4E-04 mg/m3.
(j) Value derived from RfC of 3E-4 mg/m3.
(k) Toxicity value for nickel (soluble salts)
(l) Thallium carbonate; selection based on pH of soils at NCBC Davisville

TABLE 2-7
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC SUBCHRONIC EFFECTS: INHALATION
NCBC DAVISVILLE – SITE 09

CONSTITUENT	SUBCHRONIC RFD (INHALATION) (mg/kg–day)	CONFIDENCE LEVEL (a)	CRITICAL EFFECT	INHALATION RFD BASIS/ SOURCE	UNCERTAINTY FACTOR (b)
VOLATILES					
Acetone (c)	1.0E+00		Increased liver and kidney weight	Gavage/HEAST	100
Benzene	NA			NA/HEAST	
Butanone, 2– (d)	2.9E–01		Decreased birth weight	HEAST	3000
Carbon disulfide	2.9E–03		Gestation/fetal development	HEAST	
Chlorobenzene (e)	5.0E–03		Kidney and liver effects	HEAST	10000
Chloroform (c)	1.0E–02		Liver lesions	Capsule/HEAST	1000
Dichloroethane, 1,2–	NA			NA/HEAST	
Dichloroethene, 1,2– (c)	9.0E–03		Liver lesions	Water/HEAST	1000
Dichloropropane, 1,2– (f)	3.7E–03		Nasal mucosa hyperplasia	HEAST	100
Ethylbenzene (e)	2.9E–01		Developmental toxicity	IRIS	300
Tetrachloroethane, 1,1,2,2–	NA			NA/HEAST	
Tetrachloroethene (c)	1.0E–01		Hepatotoxicity	Gavage/HEAST	100
Toluene (e)	1.1E–01		CNS effects	IRIS	300
Trichloroethane, 1,1,1–	NA			NA/HEAST	
Trichloroethene	NA			NA/HEAST	
Vinyl chloride	NA			NA/HEAST	
Xylene (total)	NA			NA/HEAST	
SEMIVOLATILES					
Acenaphthene (c)	6.0E–01		Hepatotoxicity	Gavage/HEAST	300
Acenaphthylene	NA			NA/HEAST	
Anthracene (c)	3.0E+00		None observed	Gavage/HEAST	300
Benzoic acid (c)	4.0E+00		None observed	Diet/HEAST	1
Benzotriazole	NA			NA/HEAST	
Benzotriazole, chlorinated	NA			NA/HEAST	
Benzo(a)anthracene	NA			NA/HEAST	
Benzo(a)pyrene	NA			NA/HEAST	
Benzo(b)fluoranthene	NA			NA/HEAST	
Benzo(e)pyrene	NA			NA/HEAST	
Benzo(g,h,i)perylene	NA			NA/HEAST	
Benzo(k)fluoranthene	NA			NA/HEAST	
Bis(2–chloroethyl)ether	NA			NA/HEAST	
Bis(2–chloroisopropyl)ether (c)	4.0E–02		Decreased hemoglobin	Diet/HEAST	1000
Bis(2–ethylhexyl)phthalate	NA			NA/HEAST	
Butylbenzylphthalate (c)	2.0E+00		Altered liver weight	Diet/HEAST	100
Carbazole	NA			NA/HEAST	
Chrysene	NA			NA/HEAST	
Coronene	NA			NA/HEAST	
Dibenzofuran	NA			NA/HEAST	
Dibenz(a,h)anthracene	NA			NA/HEAST	
Dichlorobenzene, 1,2–	NA			NA/HEAST	
Dichlorobenzene, 1,4– (g)	2.2E–01		Liver	HEAST	100
Diethyl phthalate (c)	8.0E+00		Decreased body and organ weights	Diet/HEAST	100
Dimethylphenol, 2,4– (c)	2.0E–01		Nervous system effects; blood alterations	Gavage/HEAST	300
Di–n–butyl phthalate (c)	1.0E+00		Increased mortality	Diet/HEAST	100
Fluoranthene (c)	4.0E–01		Kidney, liver, and blood effects	Gavage/HEAST	300
Fluorene (c)	4.0E–01		Decreased erythrocyte counts	Gavage/HEAST	300
Indeno(1,2,3–cd)pyrene	NA			NA/HEAST	
Methylnaphthalene, 2–	NA			NA/HEAST	
Methylphenol, 2– (c)	5.0E–01		Neurotoxicity; decreased weight gain	Gavage/HEAST	100
Methylphenol, 4– (c)	5.0E–02		Maternal death; respiratory distress	Gavage/HEAST	100
Naphthalene (c)	4.0E–02		Decreased body weight gain	Gavage/HEAST92	10000
Nitrophenol, 4–	NA			NA/HEAST	
Perylene	NA			NA/HEAST	
Phenanthrene	NA			NA/HEAST	
Phenol (c)	6.0E–01		Reduced fetal body weight	Gavage/HEAST	100
Pyrene (c)	3.0E–01		Renal effects	Gavage/HEAST	300
TCDD, 2,3,7,8–	NA			NA/HEAST	

TABLE 2-7 (cont.)
SUMMARY OF TOXICITY VALUES ASSOCIATED WITH NONCARCINOGENIC SUBCHRONIC EFFECTS: INHALATION
NCBC DAVISVILLE – SITE 09

CONSTITUENT	SUBCHRONIC RFD (INHALATION) (mg/kg-day)	CONFIDENCE LEVEL (a)	CRITICAL EFFECT	INHALATION RFD BASIS/ SOURCE	UNCERTAINTY FACTOR (b)
PESTICIDES / PCBs					
Aldrin (c)	3.0E-05		Liver lesions	Diet/HEAST	1000
BHC, alpha-	NA			NA/HEAST	
BHC, beta-	NA			NA/HEAST	
BHC, gamma- (c)	3.0E-03		Liver and kidney toxicity	Diet/HEAST	100
Chlordane, alpha- (c,h)	6.0E-05		Liver hypertrophy	Diet/HEAST	1000
Chlordane, gamma- (h)	6.0E-05		Liver hypertrophy	Diet/HEAST	1000
DDD, 4,4-	NA			NA/HEAST	
DDE, 4,4-	NA			NA/HEAST	
DDT, 4,4- (c)	5.0E-04		Liver lesions	Diet/HEAST	100
Dieldrin (c)	5.0E-05		Liver lesions	Diet/HEAST	100
Endosulfan II (c,i)	6.0E-03		Decreased weight gain; kidney toxicity; aneurysms	Diet/HEAST	100
Endosulfan sulfate	NA			NA/HEAST	
Endrin (c)	3.0E-04		Liver lesions; CNS convulsions	Diet/HEAST	100
Endrin aldehyde	NA			NA/HEAST	
Endrin ketone	NA			NA/HEAST	
Heptachlor (c)	5.0E-04		Increased liver weight	Diet/HEAST	300
Heptachlor epoxide (c)	1.3E-05		Increased relative liver weight	Diet/HEAST	1000
Hexachlorobenzene	NA			NA/HEAST	
Methoxychlor, p,p'- (c)	5.0E-03		Litter loss	Gavage/HEAST	1000
Aroclor-1242	NA			NA/HEAST	
Aroclor-1254	NA			NA/HEAST	
Aroclor-1260	NA			NA/HEAST	
INORGANICS					
Aluminum	NA			NA/HEAST	
Antimony (c)	4.0E-04		Increased mortality; altered blood chemistry	Water/HEAST	1000
Arsenic (c)	3.0E-04		Keratosis and hyperpigmentation	Water/HEAST	3
Barium	1.0E-03		Fetotoxicity	HEAST	100
Beryllium (c)	5.0E-03		None observed	Water/HEAST	100
Cadmium (j)	5.0E-04		Proteinuria	Diet/IRIS	10
Chromium III (c)	1.0E+00		None observed	Diet/HEAST	1000
Chromium VI (c)	2.0E-02		None observed	Water/HEAST	100
Cobalt	NA			NA/HEAST	
Copper	NA			NA/HEAST	
Cyanide (c)	2.0E-02		Weight loss, thyroid effects, myelin degeneration	Diet/HEAST	500
Lead	NA			NA/HEAST	
Manganese (k)	1.1E-04		Respiratory effects, psychomotor disturbances	HEAST	900
Mercury (l)	8.6E-05		Neurotoxicity	Occupational/HEA[illegible]	30
Nickel (c,m)	2.0E-02		Decreased body and organ weights	Diet/HEAST	300
Selenium (c)	5.0E-03		Clinical selenosis	Diet/HEAST	3
Silver (c)	5.0E-03		Dermal effects	I.V./HEAST	3
Thallium (c,n)	8.0E-04		Increased SGOT and LDH levels	Gavage/HEAST	300
Vanadium (c)	7.0E-03		None observed	Water/HEAST	100
Zinc (c)	3.0E-01		Anemia	Diet/HEAST	3

HEAST = U.S. EPA (ECAO), 1993, Health Effects Assessment Summary Tables (HEAST): Annual Update
HEAST92 = U.S. EPA (ECAO), 1992, Health Effects Assessment Summary Tables (HEAST): Annual Update. Used per verbal guidance from EPA Region I.
NA = Toxicity value not available

(a) Confidence level not specified in HEAST
(b) Modifying factor not specified in HEAST
(c) Oral toxicity value (based on systemic effects) assigned to inhalation.
(d) Value derived from RfC of 1E+0 mg/m3.
(e) Subchronic Rfc not available; chronic value used
(f) Value derived from RfC of 1.3E-2 mg/m3.
(g) Value derived from RfC of 8E-1 mg/m3.
(h) Value for "chlordane" (CAS No. 57-74-9)
(i) Value for "endosulfan" (CAS No. 115-29-7)
(j) Subchronic toxicity values not available; oral toxicity value for chronic water ingestion (based on systemic effects) assigned to inhalation.
(k) Value derived from RfC of 4E-4 mg/m3.
(l) Value derived from RfC of 3E-4 mg/m3.
(m) Toxicity value for nickel soluble salts
(n) Thallium carbonate; selection based on pH of soils at NCBC Davisville

TABLE 2-8
SUMMARY OF EXPOSURE PARAMETER VALUES
NCBC DAVISVILLE

PARAMETER	VALUE OR RANGE	VALUE USED IN PHASE I	VALUE USED IN PHASE II	RATIONALE FOR PHASE II VALUE	REFERENCE
Global variables:					
Body Weight (kg)					
– Child/Youth (Recreational)	13.1–61.2	NA	33.9	Value based on average of males and females between 2–18 yrs	EPA 1990a
– Adult (Construction; Shellfishing)	67.2–74.5	70	70	Value based on average of males and females between 18–65 yrs	EPA 1989a
Exposure Duration (yr)					
– Construction	0–52	30	1	Time spent doing construction, excavation, or utility work.	
– Recreational	0–18	NA	16	Time period over which children & youths likely to spend time at parks	
– Shellfishing	0–52	NA	30	National upper–bound (90th percentile) time at one residence	EPA 1991a
Averaging Time (d)					
– Cancer risks	NA	25,550	25,550	Value based upon 70 year life expectancy.	EPA 1989a
– Noncancer risks					
Construction	365–25,550	10,950	365	Value based upon exposure duration.	
Recreational	365–25,550	NA	5,840	Value based upon exposure duration.	
Shellfishing	365–25,550	10,950	10,950	Value based upon exposure duration.	
Relative Absorption Factors (– –)					
– Ingestion of soil and shellfish					
VOCs		1	1		EPA, 1989b
PAHs		1	1		EPA, 1989b
PCBs		0.3	0.3		EPA, 1989b
Pesticides		0.3 or 1	0.3 or 1	For chemicals with high and low soil sorption, repsectively	EPA, 1989b
Inorganics		1	1		EPA, 1989b
Lead		0.5 or 0.3	0.5 or 0.3	For children and youths/adults, respectively	EPA, 1989b
– Dermal contact with soil					
Cadmium		0.5	0.01	Fraction absorbed; unadjusted since oral RfDs are based on absorbed dose	EPA, 1992c
PCBs		0.05	0.06	Fraction absorbed; unadjusted since oral absorption >90% (ATSDR, 1989)	EPA, 1992c
TCDD		NA	0.04	Fraction absorbed; adjusted assuming 75% oral absorption as cited in HEAST	EPA, 1992c
– Inhalation of dust, volatilized constituents or ingestion of ground water		1	1	For all chemicals	EPA, 1989b
Adherence Factor for Soil (mg/cm2)	0–2.77	0.5	0.5	Based upon Region I review of soil adherence to hands.	EPA, 1989b
Fraction of Exposed Surface Area that contacts soil	0–1	0.5	0.5		EPA, 1989b
Chemical Concentration Justification:					
Surface and Subsurface Soils; Ground Water; Surface Water; Shellfish;				The geometric mean and maximum concentrations used in estimating exposure were calculated using the methods described previously	

TABLE 2-8 (cont.)
SUMMARY OF EXPOSURE PARAMETER VALUES
NCBC DAVISVILLE

PARAMETER	VALUE OR RANGE	VALUE USED IN PHASE I	VALUE USED IN PHASE II	RATIONALE FOR PHASE II VALUE	REFERENCE
Construction Scenario (Future)					
Exposure Time (hr/d)	0-24	--	8	Based upon an eight hour work day.	
Exposure Frequency (d/yr)	0-365	10	250	Number of days spent doing construction, excavation, or utility work	
Ingestion of Constituents in Soils					
Ingestion Rate (mg/d)	0-480	100	480	Based upon extensive contact with the soil.	EPA 1991a
Dermal Contact with Constituents in Soils					
Skin Surface Area (cm2)	0-18,150	2,000	4,000	Based on increased exposure relative to normal residential/recreational activities	EPA 1989b
Inhalation of Airborne Constituents					
Ambient Dust Concentration (kg/m3)	variable	--	site-specific	Based on fugitive dust model	EPA 1988
Concentration of Volatiles in Air (mg/m3)	variable	--	constituent-specific	Based on flux/ambient air model	EPA 1991b, 1992g 1993e
Inhalation Rate (m3/hr)	0.5-3.9	--	2.5	Based upon moderate exertion.	EPA 1991a
Recreational Scenario (Future)					
Exposure Frequency (d/yr)	0-365	NA	72 or 20 (a)	72 days assumes 2 d/wk, 4 wk/mo during spring, summer, and fall; 20 days assumes 2 d/wk during 10 wks of summer	
Ingestion of Constituents in Soils					
Ingestion Rate (mg/d)	0-480	NA	125	Assumes 200 mg/d for 2-6 yrs and 100 mg/d for 6-18 yrs	EPA 1991a
Dermal Contact with Constituents in Soils					
Skin Surface Area (cm2)	0-1798	NA	1,420	Assumes 25% exposed for 2-6 yrs and 10% exposed for 6-18 yrs	EPA 1990a, 1992c
Dermal Contact with Constituents in Ground Water					
Skin Surface Area (cm2)	0-12,000	NA	12,000	Based on 100% surface area exposed while showering	EPA 1992c
Exposure Time (hr/d)	0-24	NA	0.16	Assumes 10 minute showing time	EPA 1992c
Inhalation of Volatile Constituents in Ground Water					
Concentration of Volatiles in Air (mg/m3)	variable	--	constituent-specific	Based on ideal gas law	
Exposure Time (hr/d)	0-24	NA	0.16	Assumes 10 minute showing time	EPA 1992c
Ingestion of Constituents in Surface Water					
Ingestion Rate (ml/hr)	variable	NA	50	Based on reasonable estimate of water intake while swimming	EPA 1989a
Exposure Time (hr/d)	0.5-1.0	NA	0.5	Mean estimate for someone who swims recreationally	EPA 1992c
Dermal Contact with Constituents in Surface Water					
Skin Surface Area (cm2)	0-12,000	NA	12,000	Assume person is entirely immersed during swimming	EPA 1992c
Exposure Time (hr/d)	0.5-1.0	NA	0.5	Mean estimate for someone who swims recreationally	EPA 1992c
Shellfishing Scenario (Current/Future)					
Exposure Frequency (d/yr)	0-365	NA	350	Assumes two weeks of vacation	EPA 1991a
Ingestion of Constituents in Clams					
Ingestion Rate (mg/d)	NA	--	1200	Based on 150,000 mg seafood per serving 2.9 servings of clams per year (b)	NBP, n.d.
Alternative Ingestion Rate (mg/d)	NA	--	442	Mean value for clams	EPA 1990a
Ingestion of Constituents in Mussels					
Ingestion Rate (mg/d)	NA	--	1200	Based on 150,000 mg seafood per serving 2.9 servings of clams per year (b)	NBP, n.d.
Alternative Ingestion Rate (mg/d)	NA	--	13	Mean value for other shellfish (c)	EPA 1990a
Ingestion of Constituents in Oysters					
Ingestion Rate (mg/d)	NA	--	1200	Based on 150,000 mg seafood per serving 2.9 servings of clams per year (b)	NBP, n.d.
Alternative Ingestion Rate (mg/d)	NA	--	291	Mean value for oysters	EPA 1990a
Fraction from Locations Near Site 09	0-1	--	1	Maximum estimate	BPJ

NA = Not applicable; this scenario or constituent not evaluated in the Phase I RA

(a) Exposure frequency of 72 days used for ingestion of and dermal contact with chemicals in soil; exposure frequency of 20 days used for dermal contact with and inhalation of volatiles from ground water; and ingestion of and dermal contact with surface water.

(b) Ingestion rates for mussels and oysters not provided in Narragansett Bay Project (NBP) (n.d.).

(c) Ingestion rate for mussels not provided in EPA (1990a).

TABLE 2-9
CHEMICAL, PHYSICAL, AND ENVIRONMENTAL FATE PARAMETERS
NCBC DAVISVILLE - SITE 09

Constituent	Molecular Formula	Ref. Note	Molecular Weight (g/mol)	Ref. Note	Koc (--)	Ref. Note	Henry's Law Constant (atm*m3/mol)	Ref. Note	Diffusivity in Air (Da) (11) (cm2/s)	Relative Absorption Factors (RAFs) Oral (7) (--)	Relative Absorption Factors (RAFs) Dermal (8) (--)	Dermal Permability Constant (Kp) (8) (cm/hr)
INORGANICS												
Aluminum	Al	1	26.89	1	NA	4	NA	4	NA	1	NA	1.0E-03
Antimony	Sb	4	12.75	4	NA	4	NA	4	NA	1	NA	1.0E-03
Arsenic	As	4	74.92	4	NA	4	NA	4	NA	1	NA	1.0E-03
Barium	Ba	4	137.33	4	NA	4	NA	4	NA	1	NA	1.0E-03
Beryllium	Be	4	9.01	4	NA	4	NA	4	NA	1	NA	1.0E-03
Cadmium	Cd	4	112.41	4	NA	4	NA	4	NA	1	0.01	1.0E-03
Chromium III	CrIII	4	52.00	4	NA	4	NA	4	NA	1	NA	1.0E-03
Chromium VI	CrVI	4	52.00	4	NA	4	NA	4	NA	1	NA	1.0E-03
Cobalt	Co	4	58.93	4	NA	4	NA	4	NA	1	NA	4.0E-04
Copper	Cu	4	63.55	4	NA	4	NA	4	NA	1	NA	1.0E-03
Cyanide	Cn	4	26.02	4	NA	4	NA	4	NA	1	NA	1.0E-03
Lead	Pb	4	207.20	4	NA	4	NA	4	NA	0.3	NA	4.0E-06
Manganese	Mn	1	54.94	1	NA	4	NA	4	NA	1	NA	1.0E-03
Mercury	Hg	4	200.59	4	NA	4	1.1E-02	4	NA	1	NA	3.0E-03
Nickel	Ni	4	58.69	4	NA	4	NA	4	NA	1	NA	1.0E-04
Selenium	Se	1	78.96	1	NA	4	NA	4	NA	1	NA	1.0E-03
Silver	Ag	4	107.87	4	NA	4	NA	4	NA	1	NA	6.0E-04
Thallium	Tl	1	204.38	1	NA	4	NA	4	NA	1	NA	1.0E-03
Vanadium	V	1	50.94	1	NA	4	NA	4	NA	1	NA	1.0E-03
Zinc	Zn	4	65.38	4	NA	4	NA	4	NA	1	NA	6.0E-04
VOLATILES												
Acetone	C_3H_6O	4	58.08	4	3.7E-01	3	4.3E-05	4	1.0E-01	1	NA	5.7E-04
Benzene	C_6H_6	4	78.11	4	8.1E+01	3	5.6E-03	4	8.7E-02	1	NA	2.1E-02
Butanone, 2-	C_4H_8O	4	72.11	4	1.2E+00	3	4.7E-05	4	8.9E-02	1	NA	1.1E-03
Carbon disulfide	C_6S_2	4	76.13	4	3.0E+02	3	1.9E-02	4	7.4E-02	1	NA	2.4E-02
Chlorobenzene	C_6H_5Cl	4	112.56	4	1.9E+02	3	3.9E-03	4	7.7E-02	1	NA	4.1E-02
Chloroform	$CHCl_3$	4	119.38	4	4.4E+01	3	3.4E-03	4	8.8E-02	1	NA	8.9E-03
Dichloroethane, 1,2-	$C_2H_4Cl_2$	4	98.96	4	1.6E+01	3	1.2E-03	4	8.9E-02	1	NA	5.3E-03
Dichloroethene, 1,2- (Total)	$C_2H_2Cl_2$	4	96.94	4	5.9E+01	3	6.7E-03	4	9.1E-02	1	NA	1.0E-02
Dichloropropane, 1,2-	$C_3H_6Cl_2$	4	112.99	4	3.7E+01	3	2.7E-03	4	8.0E-02	1	NA	1.0E-02
Ethyl benzene	C_8H_{10}	4	106.17	4	1.8E+02	3	8.0E-03	4	7.1E-02	1	NA	7.4E-02
Tetrachloroethane, 1,1,2,2-	$C_2H_2Cl_4$	4	167.85	4	8.2E+01	3	4.6E-04	3	7.3E-02	1	NA	9.0E-03
Tetrachloroethene	C_2Cl_4	4	165.83	4	2.8E+02	3	2.7E-02	4	7.4E-02	1	NA	4.8E-02
Toluene	C_7H_8	4	92.14	4	1.3E+02	3	5.9E-03	4	7.8E-02	1	NA	4.5E-02
Trichloroethane, 1,1,1-	$C_2H_3Cl_3$	3	133.40	3	1.3E+02	3	1.6E-02	3	8.2E-02	1	NA	1.7E-02
Trichloroethene	C_2HCl	4	131.39	4	9.9E+01	3	1.2E-02	4	8.1E-02	1	NA	1.6E-02
Vinyl chloride	C_2H_3Cl	4	62.50	4	2.5E+00	3	2.8E-02	4	1.1E-01	1	NA	7.3E-03
Xylenes (total)	C_8H_{10}	4	106.17	4	6.4E+02	3	6.7E-03	4	7.1E-02	1	NA	8.0E-02

TABLE 2-9 (cont.)
CHEMICAL, PHYSICAL, AND ENVIRONMENTAL FATE PARAMETERS
NCBC DAVISVILLE - SITE 09

Constituent	Molecular Formula	Ref. Note	Molecular Weight (g/mol)	Ref. Note	Koc (--)	Ref. Note	Henry's Law Constant (atm*m3/mol)	Ref. Note	Diffusivity in Air (Da) (11) (cm2/s)	Relative Absorption Factors (RAFs) Oral (7) (--)	Relative Absorption Factors (RAFs) Dermal (8) (--)	Dermal Permability Constant (Kp) (8) (cm/hr)
SEMIVOLATILES												
Acenaphthene	$C_{12}H_{10}$	4	154.21	4	1.8E+01	3	2.4E-04	4	6.0E-02	1	NA	1.3E-01
Acenaphthylene	$C_{12}H_8$	4	152.20	4	4.8E+03	3	1.1E-04	4	6.1E-02	1	NA	1.8E-01
Anthracene	$C_{14}H_{10}$	4	178.23	4	2.0E+04	3	8.6E-05	4	5.8E-02	1	NA	2.2E-01
Benzoic acid	$C_7H_6O_2$	4	122.12	3	1.8E+02	3	7.0E-08	3	NA	1	NA	7.3E-03
Benzotriazole	$C_6H_5N_3$	1	119.12	1	NR (9)		NR (9)		NR (9)	1	NR (9)	NR (9)
Benzotriazole, chlorinated	NA	1	NA	1	NR (9)		NR (9)		NR (9)	1	NR (9)	NR (9)
Benzo(a)anthracene	$C_{18}H_{12}$	4	228.29	4	1.4E+06	3	6.6E-07	4	NA	1	NA	8.1E+00
Benzo(a)pyrene	$C_{20}H_{12}$	4	252.32	4	1.2E+06	3	4.9E-07	4	NA	1	NA	1.2E+00
Benzo(b/k)fluoranthene (5)	$C_{20}H_{12}$	4	252.32	4	5.5E+05	3	1.2E-05	4	NA	1	NA	1.2E+00
Benzo(e)pyrene	$C_{20}H_{12}$	4	252.32	4	NR (9)		NR (9)		NR (9)	1	NR (9)	NR (9)
Benzo(ghi)perylene	$C_{22}H_{12}$	3	276.34	3	7.8E+06	3	1.4E-07	3	NA	1	NA	4.4E+00
Bis(2-chloroethyl)ether	$C_4H_8Cl_2O$	3	143.01	3	1.4E+01	3	1.3E-05	3	7.1E-02	1	NA	2.1E-03
Bis(2-chloroisopropyl)ether	$C_6H_{12}Cl_2O$	3	171.07	3	6.2E+01	3	1.1E-04	3	6.2E-02	1	NA	1.2E-02
Bis (2-ethylhexyl)phthalate	$C_{24}H_{38}O_4$	4	390.54	4	1.0E+05	3	3.0E-07	4	NA	1	NA	3.3E-02
Butyl benzyl phthalate	$C_{19}H_{20}O_4$	4	312.40	4	2.1E+02	3	1.3E-06	4	NA	1	NA	5.8E-02
Carbazole	$C_{12}H_9N$	1	167.20	1	NA	4	NA	4	NA	1	NA	NA
Chrysene	$C_{18}H_{12}$	4	228.29	4	2.5E+05	3	1.1E-06	4	NA	1	NA	8.1E-01
Coronene	$C_{24}H_{12}$	10	300.36	10	NR (9)		NR (9)		NR (9)	1	NR (9)	NR (9)
Dibenzofuran	$C_{12}H_8O$	4	168.19	4	1.0E+04	3	NA	4	NA	1	NA	1.5E-01
Dibenzo(a,h)anthracene	$C_{22}H_{14}$	3	278.36	3	1.7E+06	3	7.3E-09	3	NA	1	NA	2.7E+00
Dichlorobenzene, 1,2-	$C_6H_4Cl_2$	3	147.00	3	6.6E+02	3	2.4E-03	3	7.1E-02	1	NA	6.1E-02
Dichlorobenzene, 1,4-	$C_6H_4Cl_2$	3	147.00	3	1.6E+02	3	4.5E-03	3	7.1E-02	1	NA	6.2E-02
Diethyl phthalate	$C_{12}H_{14}O_4$	3	222.24	3	6.9E+01	3	8.5E-07	3	NA	1	NA	4.8E-03
Dimethylphenol, 2,4-	$C_8H_{10}O$	4	122.17	4	1.2E+02	3	6.6E-06	4	NA	1	NA	1.5E-02
Di-n-butyl phthalate	$C_{16}H_{22}O_4$	3	278.35	3	1.4E+03	3	6.3E-05	3	NA	1	NA	3.3E-02
Fluoranthene	$C_{16}H_{10}$	4	202.26	4	4.2E+04	3	6.5E-06	4	NA	1	NA	3.6E-01
Fluorene	$C_{13}H_{10}$	4	166.22	4	5.0E+03	3	1.2E-04	4	5.8E-02	1	NA	1.7E-01
Indeno(1,2,3-cd)pyrene	$C_{22}H_{12}$	4	276.34	4	3.1E+07	3	7.0E-08	4	NA	1	NA	1.9E+00
Methylnaphthalene, 2-	$C_{11}H_{10}$	4	142.20	4	8.0E+03	3	5.0E-04	4	6.4E-02	1	NA	3.7E-05
Methylphenol, 2-	C_7H_8O	4	108.14	4	2.2E+01	3	8.4E-07	4	NA	1	NA	1.0E-02
Methylphenol, 4-	$C_8H_{10}O$	4	108.14	4	4.9E+01	3	3.9E-07	4	NA	1	NA	1.0E-02
Naphthalene	$C_{10}H_8$	4	128.17	4	1.6E+03	3	4.8E-04	4	6.8E-02	1	NA	6.9E-02
Nitrophenol, 4-	$C_6H_5NO_3$	3	139.11	3	3.7E+01	3	3.5E-06	3	NA	1	NA	6.1E-03
Perylene	$C_{20}H_{12}$	1	252.3	1	NR (9)		NR (9)		NR (9)	1	NR (9)	NR (9)
Phenanthrene	$C_{14}H_{10}$	4	178.23	4	2.2E+04	3	3.9E-05	4	5.8E-02	1	NA	2.7E-01
Phenol	C_6H_6O	4	94.11	4	2.2E+01	3	1.3E-06	4	NA	1	NA	5.5E-03
Pyrene	$C_{16}H_{10}$	4	202.26	4	7.3E+04	3	5.1E-06	4	NA	1	NA	5.3E-01
TCDD, 2,3,7,8-	$C_{12}H_4Cl_4O_2$	3	321.98	3	4.6E+06	3	5.4E-23	3	NA	1	0.04	1.4E+00

TABLE 2-9 (cont.)
CHEMICAL, PHYSICAL, AND ENVIRONMENTAL FATE PARAMETERS
NCBC DAVISVILLE - SITE 09

Constituent	Molecular Formula	Ref. Note	Molecular Weight (g/mol)	Ref. Note	Koc (--)	Ref. Note	Henry's Law Constant (atm*m3/mol)	Ref. Note	Diffusivity in Air (Da) (11) (cm2/s)	Relative Absorption Factors (RAFs) Oral (7) (--)	Relative Absorption Factors (RAFs) Dermal (8) (--)	Dermal Permability Constant (Kp) (8) (cm/hr)
PESTICIDES/PCBs												
Aldrin	$C_{12}H_8Cl_6$	4	364.91	4	4.1E+02	3	5.0E-04	4	NA	1	NA	1.6E-03
BHC, alpha-	$C_6H_6Cl_6$	4	290.83	4	1.9E+03	3	5.3E-06	4	NA	1	NA	1.4E-02
BHC, beta-	$C_6H_6Cl_6$	4	290.83	4	2.9E+03	3	2.3E-07	4	NA	1	NA	1.6E-02
BHC, gamma-	$C_6H_6Cl_6$	4	290.83	4	NR (9)		NR (9)		NR (9)	1	NR (9)	NR (9)
Chlordane, alpha	$C_{10}H_6Cl_8$	4	409.80	4	3.3E+05	3	4.8E-05	4	NA	0.3	NA	5.2E-02
Chlordane, gamma-	$C_{10}H_6Cl_8$	4	409.80	4	6.5E+05	3	NA	3	NA	0.3	NA	4.6E-02
DDD, 4,4'-	$C_{14}H_{10}Cl_4$	4	320.05	4	4.4E+04	3	2.2E-05	4	NA	0.3	NA	2.8E-01
DDE, 4,4'-	$C_{14}H_8Cl_4$	4	319.03	4	6.2E+05	3	2.3E-05	4	NA	0.3	NA	2.4E-01
DDT, 4,4'-	$C_{14}H_9Cl_5$	4	354.49	4	4.6E+05	3	3.9E-05	4	NA	0.3	NA	4.3E-01
Dieldrin	$C_{12}H_8Cl_6O$	4	380.91	4	2.4E+04	3	5.9E-05	4	NA	0.3	NA	1.6E-02
Endosulfan II	$C_9H_6Cl_6O_3S$	3	406.92	3	3.4E+03	3	1.9E-05	3	NA	1	NA	2.3E-03
Endosulfan sulfate	$C_9H_6Cl_6O_4S$	3	422.92	3	2.3E+03	3	NA	3	NA	1	NA	2.0E-03
Endrin	$C_{12}H_8Cl_6O$	4	380.92	4	8.3E+03	3	4.0E-07	4	NA	0.3	NA	1.6E-02
Endrin aldehyde	$C_{12}H_8Cl_6O$	3	380.92	3	2.7E+04	3	3.9E-07	3	NA	0.3	NA	8.6E-02
Endrin ketone (6)	$C_{12}H_8Cl_6O$	4	380.92	4	8.3E+03	3	4.0E-07	4	NA	0.3	NA	1.6E-02
Heptachlor	$C_{10}H_5Cl_7$	4	373.32	4	2.2E+04	3	1.5E-03	4	NA	0.3	NA	1.9E-02
Heptachlor epoxide	$C_{10}H_5Cl_7O$	4	389.32	4	2.1E+04	3	3.2E-05	4	NA	0.3	NA	3.2E-03
Hexachlorobenzene	C_6Cl_6	4	284.78	4	NR (9)		NR (9)		NR (9)	0.3	NR (9)	NR (9)
Methoxychlor, p,p'-	$C_{16}H_{15}Cl_3O_2$	3	345.66	3	8.4E+04	3	NA	3	NA	0.3	NA	2.5E-02
Aroclor-1242	NA	3	261.00	3	NR (9)		NR (9)		NR (9)	0.3	NR (9)	NR (9)
Aroclor-1254	NA	3	327.00	3	NR (9)		NR (9)		NR (9)	0.3	NR (9)	NR (9)
Aroclor-1260	NA	3	370.00	3	2.6E+06	3	7.1E-03	3	NA	0.3	0.06	7.1E-01

[1] Budavari et al (1990)
[2] Howard (1991)
[3] Montgomery and Welkum (1990)
[4] EPA (1992f)
[5] Values for benzo(b)fluorathene used
[6] Values for endrin used
[7] EPA (1989b)
[8] EPA (1992c)
[9] Not relevant; identified as a COC only in shellfish
[10] Lewis (1992)

[11] Where $Da = [1E-03 \times T^{1.75} \times ((MWa + MWc) / (MWa \times MWc))^{0.5}] / [P \times (Va^{0.33} + Vc^{0.33})^2]$ from Eq. 17-12 in Lyman et al. (1990); shown only for volatile COCs with MW < 200 g/mol and Henry's Law constant > 1E-05 atm*m3/mol

Da =	Diffusivity in air	CS cm/s
T =	Temperature	293 °K
MAa =	Molecular weight of air	29 g/mol
MWc =	Molecular weight of chemical	CS g/mol
P =	Pressure	1 atm
Va =	Molar volume of air	20 cm3/mol
Vc =	Molar volume of chemical	CS cm3/mol; estimated using Table 17-4 in Lyman et al. (1990)

TABLE 3-1
DATA COLLECTION FOR PHASE I AND II INVESTIGATIONS
NCBC DAVISVILLE – SITE 09

	Number of Samples			
	Phase I	Phase II	Phase III	Total
Surface Soil (<=2 feet) (a)	18	23 (3)	NA	41 (3)
Subsurface Soil (>2–10 feet) (b)	9	10	NA	19
Ground Water (c)	8	19 (1)	NA	27 (1)
Surface Water (d)	0	4	NA	4
Clam (e)	9	18	1	28
Mussel (f)	2	18	0	20
Oyster	3	0	0	3
Other (g,h)	8	4	NA	12

(#) = Number of duplicate samples collected
NA = Not Applicable
(a) Phase I surface soil samples collected at depths of 0–.5 and 0–2 feet below grade.
Phase II surface soil samples collected at depths of 0–1, 0.5–1, and 0–2 feet below grade.
(b) Subsurface soil samples collected down to a depth of 46 feet:
Only samples collected from 0–10 feet are included in the quantitative risk assessment
(c) Unfiltered
(d) Collected from the Allen Harbor drainage system near the Allen Harbor Landfill
(e) Hard–shell and soft shell clams
(f) Deployed blue mussels
(g) Four sediment samples and four aqueous seeps samples collected during Phase I
(h) Four sediment samples taken during Phase II

TABLE 3-2
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SURFACE SOIL (0 TO 2 FEET)
NCBC DAVISVILLE – SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/kg)
INORGANICS							
Aluminum	41	41	1.00	2.36E+03	3.79E+04	S-09-05-00-S	5.7E+03
Antimony	41	9	0.22	9.70E+00	6.53E+01	S-09-02-00-S	1.2E+01
Arsenic	41	34	0.83	9.30E-01	3.25E+01	S-09-02-00-S	2.6E+00
Barium	41	41	1.00	7.10E+00	1.19E+03	S-09-05-00-S	3.6E+01
Beryllium	41	32	0.78	2.50E-01	7.54E+01	S-09-05-00-S	1.1E+00
Cadmium	41	29	0.71	3.10E-02	1.72E+02	09-B2-01	1.7E+00
Calcium	41	36	0.88	2.12E+02	3.28E+04	S-09-05-00-S	1.2E+03
Chromium	41	41	1.00	3.00E+00	9.55E+02	S-09-05-00-S	2.1E+01
Cobalt	41	39	0.95	1.90E+00	4.31E+02	S-09-05-00-S	9.4E+00
Copper	41	35	0.85	2.70E+00	2.47E+04	S-09-05-00-S	9.6E+01
Cyanide	41	4	0.10	5.40E-01	1.10E+00	TP-1-00-S	5.8E-01
Iron	41	41	1.00	6.06E+03	3.69E+05	S-09-02-00-S	2.0E+04
Lead	41	41	1.00	3.80E+00	8.71E+03	S-09-05-00-S	1.1E+02
Magnesium	41	41	1.00	3.73E+02	1.46E+04	S-09-05-00-S	1.6E+03
Manganese	41	41	1.00	2.26E+01	2.92E+03	S-09-05-00-S	1.9E+02
Mercury	41	17	0.41	1.10E-01	2.80E+00	09-MW1101	2.1E-01
Nickel	41	28	0.68	4.70E+00	4.21E+03	S-09-05-00-S	2.9E+01
Potassium	41	21	0.51	2.73E+02	1.96E+03	S-09-05-00-S	5.6E+02
Selenium	39	4	0.10	9.70E-01	3.20E+00	S-09-05-00-S	9.4E-01
Silver	41	27	0.66	5.50E-02	3.31E+01	S-09-05-00-S	7.5E-01
Sodium	41	22	0.54	4.56E+01	1.07E+04	S-09-03-00-S	3.4E+02
Thallium	41	1	0.02	3.50E-01	3.50E-01	TP-9-00-S	6.7E-01 *
Vanadium	41	40	0.98	4.50E+00	1.34E+02	S-09-01-00-S	1.8E+01
Zinc	41	38	0.93	1.44E+01	3.43E+04	S-09-05-00-S	2.8E+02
VOLATILES							
1,1-Dichloroethane	41	0	ND	--	--	--	--
1,1-Dichloroethene	41	0	ND	--	--	--	--
1,1,1-Trichloroethane	41	3	0.07	2.00E-03	4.00E-03	09-SS07	7.7E-03 *
1,1,2-Trichloroethane	41	0	ND	--	--	--	--
1,1,2,2-Tetrachloroethane	41	0	ND	--	--	--	--
1,2-Dichloroethane	41	0	ND	--	--	--	--
1,2-Dichloroethene(Total)	41	0	ND	--	--	--	--
1,2-Dichloropropane	41	0	ND	--	--	--	--
2-Butanone	41	0	ND	--	--	--	--
2-Hexanone	41	0	ND	--	--	--	--
4-Methyl-2-pentanone	41	0	ND	--	--	--	--
Acetone	41	9	0.22	1.10E-02	1.10E-01	S-09-01-00-S	1.7E-02
Benzene	41	0	ND	--	--	--	--
Bromodichloromethane	41	0	ND	--	--	--	--
Bromoform	41	0	ND	--	--	--	--
Bromomethane	41	0	ND	--	--	--	--
Carbon disulfide	41	0	ND	--	--	--	--
Carbon tetrachloride	41	0	ND	--	--	--	--
Chlorobenzene	41	0	ND	--	--	--	--
Chloroethane	41	0	ND	--	--	--	--
Chloroform	41	7	0.17	1.00E-03	1.60E-02	S-09-03-00-S	6.9E-03
Chloromethane	41	0	ND	--	--	--	--
Cis-1,3-Dichloropropene	41	0	ND	--	--	--	--
Dibromochloromethane	41	0	ND	--	--	--	--
Ethylbenzene	41	0	ND	--	--	--	--
Methylene chloride	41	0	ND	--	--	--	--
Styrene	41	0	ND	--	--	--	--
Tetrachloroethene	41	3	0.07	1.00E-03	1.20E-02	09-B1-01	7.6E-03
Toluene	41	3	0.07	2.00E-03	3.00E-03	09-MW5-01	4.0E-03 *
Trans-1,3-Dichloropropene	41	0	ND	--	--	--	--
Trichloroethene	41	0	ND	--	--	--	--
Vinyl acetate	18	0	ND	--	--	--	--
Vinyl chloride	41	0	ND	--	--	--	--
Xylenes (Total)	41	0	ND	--	--	--	--

TABLE 3-2 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SURFACE SOIL (0 TO 2 FEET)
NCBC DAVISVILLE - SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/kg)
SEMIVOLATILES							
1,2-Dichlorobenzene	40	0	ND	--	--	--	--
1,2,4-Trichlorobenzene	40	1	0.03	2.40E-01	2.40E-01	09-MW1101	4.1E-01 *
1,3-Dichlorobenzene	40	0	ND	--	--	--	--
1,4-Dichlorobenzene	40	0	ND	--	--	--	--
2-Chloronaphthalene	40	0	ND	--	--	--	--
2-Chlorophenol	40	0	ND	--	--	--	--
2-Methylnaphthalene	41	7	0.17	4.20E-02	4.30E+00	09-B7-01	3.7E-01
2-Methylphenol	40	0	ND	--	--	--	--
2-Nitroaniline	40	0	ND	--	--	--	--
2-Nitrophenol	40	0	ND	--	--	--	--
2,4-Dichlorophenol	40	0	ND	--	--	--	--
2,4-Dimethylphenol	40	1	0.03	3.70E-01	3.70E-01	09-B7-01	4.0E-01 *
2,4-Dinitrophenol	40	0	ND	--	--	--	--
2,4-Dinitrotoluene	40	0	ND	--	--	--	--
2,4,5-Trichlorophenol	40	0	ND	--	--	--	--
2,4,6-Trichlorophenol	40	0	ND	--	--	--	--
2,6-Dinitrotoluene	40	0	ND	--	--	--	--
3-Nitroaniline	40	0	ND	--	--	--	--
3,3'-Dichlorobenzidine	40	0	ND	--	--	--	--
4-Bromophenyl phenyl ether	40	0	ND	--	--	--	--
4-Chloro-3-methylphenol	40	0	ND	--	--	--	--
4-Chloroaniline	40	0	ND	--	--	--	--
4-Chlorophenyl phenyl ether	40	0	ND	--	--	--	--
4-Methylphenol	40	1	0.03	5.70E-01	5.70E-01	09-B7-01	4.3E-01
4-Nitroaniline	40	0	ND	--	--	--	--
4-Nitrophenol	40	0	ND	--	--	--	--
4,6-Dinitro-2-methylphenol	40	0	ND	--	--	--	--
Acenaphthene	41	24	0.59	3.80E-02	1.40E+01	09-B7-01	3.1E-01
Acenaphthylene	40	5	0.13	3.60E-02	9.10E-01	09-B7-01	3.8E-01
Anthracene	41	25	0.61	5.10E-02	2.15E+01	09-MW5-01	4.2E-01
Benzoic acid	18	7	0.39	4.90E-02	8.70E-01	TP-1-00-S	4.7E-01
Benzo(a)anthracene	41	30	0.73	4.40E-02	6.90E+01	09-B7-01	7.8E-01
Benzo(a)pyrene	41	29	0.71	7.10E-02	4.50E+01	09-B7-01	6.9E-01
Benzo(b)fluoranthene	26	18	0.69	1.20E-01	1.10E+02	09-B7-01	1.4E+00
Benzo(b/k)fluoranthene	15	13	0.87	4.20E-02	3.80E+00	TP-3-00-S	6.0E-01
Benzo(g,h,i)perylene	41	26	0.63	7.00E-02	2.90E+01	09-MW5-01	4.7E-01
Benzo(k)fluoranthene	23	16	0.70	1.30E-01	1.10E+02	09-B7-01	1.7E+00
Benzyl alcohol	18	0	ND	--	--	--	--
Bis(2-chloroethoxy)methane	40	0	ND	--	--	--	--
Bis(2-chloroethyl)ether	40	0	ND	--	--	--	--
Bis(2-chloroisopropyl)ether	40	0	ND	--	--	--	--
Bis(2-ethylhexyl)phthalate	40	22	0.55	5.60E-02	2.30E+00	09-SS-05	4.2E-01
Butyl benzyl phthalate	40	7	0.18	3.40E-02	3.30E-01	09-B3-01	3.2E-01
Carbazole	23	14	0.61	7.50E-02	1.80E+01	09-B7-01	5.3E-01
Chrysene	41	30	0.73	5.10E-02	6.30E+01	09-B7-01	7.6E-01
Dibenzofuran	41	21	0.51	4.00E-02	8.40E+00	09-B7-01	2.1E-01
Dibenzo(a,h)anthracene	40	24	0.60	5.10E-02	6.50E+00	09-B3-01	2.8E-01
Diethyl phthalate	40	1	0.03	6.40E-02	6.40E-02	09-MW11-01	2.3E-01 *
Dimethyl phthalate	40	0	ND	--	--	--	--
Di-n-butyl phthalate	40	11	0.28	4.00E-02	5.70E+00	TP-6-00-S	3.6E-01
Di-n-octyl phthalate	40	0	ND	--	--	--	--
Fluoranthene	41	30	0.73	4.90E-02	1.40E+02	09-B7-01	1.2E+00
Fluorene	40	23	0.58	3.90E-02	1.50E+01	09-B7-01	2.5E-01
Hexachlorobenzene	40	0	ND	--	--	--	--
Hexachlorobutadiene	40	0	ND	--	--	--	--
Hexachlorocyclopentadiene	40	0	ND	--	--	--	--
Hexachloroethane	40	0	ND	--	--	--	--
Indeno(1,2,3-cd)pyrene	41	28	0.68	7.50E-02	2.35E+01	09-MW5-01	4.6E-01
Isophorone	40	0	ND	--	--	--	--
Naphthalene	41	14	0.34	4.10E-02	9.30E+00	09-B7-01	3.2E-01
Nitrobenzene	40	0	ND	--	--	--	--
N-Nitroso-di-n-propylamine	40	0	ND	--	--	--	--
N-Nitrosodiphenylamine	40	0	ND	--	--	--	--
Pentachlorophenol	40	2	0.05	5.20E-02	9.80E-02	09-MW11-01	5.2E-01 *
Phenanthrene	41	29	0.71	5.20E-02	1.30E+02	09-B7-01	1.0E+00
Phenol	40	0	ND	--	--	--	--
Pyrene	41	31	0.76	4.50E-02	1.20E+02	09-B7-01	9.9E-01
2,3,7,8-TCDD	6	5	0.83	2.07E-04	2.28E-04	09-SS01	2.1E-04

TABLE 3–2 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SURFACE SOIL (0 TO 2 FEET)
NCBC DAVISVILLE – SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/kg)
PESTICIDES/PCBs							
4,4'–DDD	41	15	0.37	8.00E–04	9.50E–02	09–B6–01	1.2E–02
4,4'–DDE	41	16	0.39	2.30E–04	1.60E–02	09–B6–01	1.0E–02
4,4'–DDT	41	12	0.29	4.30E–04	5.95E–02	09–SS05	1.7E–02
Aldrin	40	0	ND	––	––	––	––
Alpha chlordane	41	11	0.27	7.00E–05	2.80E–02	09–SS01	1.4E–02
Alpha–BHC	41	2	0.05	8.40E–05	9.80E–05	09–MW9–01	3.3E–03 *
Beta–BHC	41	3	0.07	1.00E–03	2.10E–02	B–09–01–00–S	6.9E–03
Delta–BHC	41	1	0.02	7.60E–04	7.60E–04	09–B7–01	3.5E–03 *
Dieldrin	41	11	0.27	2.00E–04	5.40E–02	09–B1–01	9.0E–03
Endosulfan I	41	2	0.05	9.00E–03	1.12E–02	09–MW5–01	6.8E–03
Endosulfan II	41	6	0.15	1.70E–04	7.40E–03	09–B7–01	7.4E–03 *
Endosulfan sulfate	41	8	0.20	6.20E–04	3.30E–02	09–B1–01	1.1E–02
Endrin	41	8	0.20	9.80E–05	2.40E–02	09–B7–01	9.3E–03
Endrin aldehyde	23	10	0.43	4.50E–04	1.10E–01	09–B7–01	5.3E–03
Endrin ketone	41	4	0.10	3.00E–04	5.70E–02	09–B7–01	1.2E–02
Gamma chlordane	41	13	0.32	1.90E–04	2.30E–02	09–SS01	1.3E–02
Gamma–BHC (Lindane)	40	0	ND	––	––	––	––
Heptachlor	40	4	0.10	9.10E–05	1.40E–03	09–MW10–01	5.6E–03 *
Heptachlor epoxide	41	7	0.17	4.50E–04	2.90E–02	09–B1–01	6.1E–03
Aroclor–1016	41	0	ND	––	––	––	––
Aroclor–1221	41	0	ND	––	––	––	––
Aroclor–1232	41	0	ND	––	––	––	––
Aroclor–1242	41	0	ND	––	––	––	––
Aroclor–1248	41	0	ND	––	––	––	––
Aroclor–1254	41	1	0.02	2.60E+00	2.60E+00	TP–3–00–S	1.4E–01
Aroclor–1260	41	13	0.32	1.70E–02	3.00E+01	09–MW1101	2.0E–01
p,p'–Methoxychlor	41	5	0.12	4.00E–04	6.30E–01	09–B7–01	5.4E–02
Toxaphene	41	0	ND	––	––	––	––

ND = Not detected
* = Mean exceeds maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent

TABLE 3-3
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SUBSURFACE SOIL (2 TO 10 FEET)
NCBC DAVISVILLE – SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/kg)
INORGANICS							
Aluminum	20	20	1.00	3.06E+03	1.83E+04	09-MW8-04	6.0E+03
Antimony	20	5	0.25	1.25E+01	8.98E+01	09-MW8-04	1.3E+01
Arsenic	20	20	1.00	8.70E-01	1.36E+01	09-MW8-04	3.1E+00
Barium	20	20	1.00	5.10E+00	6.79E+02	TP-3-06-S	5.5E+01
Beryllium	20	16	0.80	2.20E-01	5.60E+00	09-MW7-02	1.1E+00
Cadmium	20	15	0.75	2.60E-02	5.63E+01	09-MW8-04	3.5E+00
Calcium	20	19	0.95	2.01E+02	2.15E+04	09-MW5-04	2.3E+03
Chromium	20	20	1.00	3.40E+00	1.54E+02	09-MW8-04	1.9E+01
Cobalt	20	20	1.00	2.50E+00	2.64E+01	09-MW7-02	8.9E+00
Copper	20	18	0.90	7.40E+00	2.75E+03	TP-8-06-S	1.0E+02
Cyanide	20	0	ND	--	--	--	--
Iron	20	20	1.00	6.85E+03	1.56E+05	09-MW8-04	1.7E+04
Lead	20	20	1.00	3.40E+00	2.13E+03	09-B7-04	1.3E+02
Magnesium	20	20	1.00	5.94E+02	5.99E+03	09-B7-04	1.4E+03
Manganese	20	20	1.00	5.82E+01	1.27E+03	09-MW8-04	1.9E+02
Mercury	20	11	0.55	1.30E-01	1.70E+00	09-MW8-04	2.3E-01
Nickel	20	17	0.85	5.90E+00	2.27E+02	09-MW8-04	3.0E+01
Potassium	20	11	0.55	1.99E+02	1.62E+03	09-B7-04	5.3E+02
Selenium	19	0	ND	--	--	--	--
Silver	20	13	0.65	2.90E-01	3.49E+01	09-MW8-04	1.5E+00
Sodium	20	8	0.40	4.15E+01	2.64E+03	09-B7-04	3.4E+02
Thallium	20	2	0.10	5.10E-01	6.90E-01	TP-8-06-S	6.0E-01
Vanadium	20	20	1.00	4.20E+00	8.23E+02	09-MW8-04	2.3E+01
Zinc	20	18	0.90	1.95E+01	3.08E+03	09-B7-04	3.3E+02
VOLATILES							
1,1-Dichloroethane	20	0	ND	--	--	--	--
1,1-Dichloroethene	20	0	ND	--	--	--	--
1,1,1-Trichloroethane	20	1	0.05	2.00E-03	2.00E-03	09-MW8-04	7.8E-03 *
1,1,2-Trichloroethane	20	0	ND	--	--	--	--
1,1,2,2-Tetrachloroethane	20	0	ND	--	--	--	--
1,2-Dichloroethane	20	0	ND	--	--	--	--
1,2-Dichloroethene(Total)	20	0	ND	--	--	--	--
1,2-Dichloropropane	20	0	ND	--	--	--	--
2-Butanone	20	2	0.10	6.00E-03	1.80E+02	TP-6-02-S	2.0E-02
2-Hexanone	20	0	ND	--	--	--	--
4-Methyl-2-pentanone	20	0	ND	--	--	--	--
Acetone	20	7	0.35	8.00E-03	5.90E+01	TP-6-02-S	4.7E-02
Benzene	20	2	0.10	3.20E-02	1.50E+00	TP-6-02-S	1.3E-02
Bromodichloromethane	20	0	ND	--	--	--	--
Bromoform	20	0	ND	--	--	--	--
Bromomethane	20	0	ND	--	--	--	--
Carbon disulfide	20	0	ND	--	--	--	--
Carbon tetrachloride	20	0	ND	--	--	--	--
Chlorobenzene	20	3	0.15	2.00E-03	1.80E-01	09-MW1105	1.6E-02
Chloroethane	20	0	ND	--	--	--	--
Chloroform	20	2	0.10	2.00E-03	2.00E-03	TP-3-06-S,TP-9-08-S	7.7E-03 *
Chloromethane	20	0	ND	--	--	--	--
Cis-1,3-Dichloropropene	20	0	ND	--	--	--	--
Dibromochloromethane	20	0	ND	--	--	--	--
Ethylbenzene	20	6	0.30	2.00E-03	9.10E+02	TP-6-02-S	1.5E-02
Methylene chloride	20	1	0.05	5.60E+01	5.60E+01	TP-6-02-S	3.9E-02
Styrene	20	0	ND	--	--	--	--
Tetrachloroethene	20	2	0.10	2.00E-03	2.00E-03	09-MW5,8-04	1.3E-02 *
Toluene	20	6	0.30	2.00E-03	1.50E+04	TP-6-02-S	1.4E-02
Trans-1,3-Dichloropropene	20	0	ND	--	--	--	--
Trichloroethene	20	4	0.20	1.00E-03	3.80E+00	TP-6-02-S	1.0E-02
Vinyl acetate	10	0	ND	--	--	--	--
Vinyl chloride	20	0	ND	--	--	--	--
Xylenes (Total)	20	9	0.45	1.00E-03	4.20E+03	TP-6-02-S	2.4E-02

TABLE 3–3 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SUBSURFACE SOIL (2 TO 10 FEET)
NCBC DAVISVILLE – SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/kg)
SEMIVOLATILES							
1,2–Dichlorobenzene	20	2	0.10	5.90E–02	4.30E+00	TP–6–02–S	6.3E–01
1,2,4–Trichlorobenzene	20	1	0.05	4.60E–02	4.60E–02	TP–5–06–S	3.6E–01 *
1,3–Dichlorobenzene	20	0	ND	––	––	––	––
1,4–Dichlorobenzene	20	3	0.15	7.30E–02	8.40E–01	09–MW1105	5.5E–01
2–Chloronaphthalene	20	0	ND	––	––	––	––
2–Chlorophenol	20	0	ND	––	––	––	––
2–Methylnaphthalene	20	11	0.55	1.90E–01	5.00E+00	09–B7–04	7.1E–01
2–Methylphenol	20	1	0.05	5.80E–02	5.80E–02	09–MW8–04	3.6E–01 *
2–Nitroaniline	20	0	ND	––	––	––	––
2–Nitrophenol	20	0	ND	––	––	––	––
2,4–Dichlorophenol	20	0	ND	––	––	––	––
2,4–Dimethylphenol	20	0	ND	––	––	––	––
2,4–Dinitrophenol	20	0	ND	––	––	––	––
2,4–Dinitrotoluene	20	0	ND	––	––	––	––
2,4,5–Trichlorophenol	20	0	ND	––	––	––	––
2,4,6–Trichlorophenol	20	0	ND	––	––	––	––
2,6–Dinitrotoluene	20	0	ND	––	––	––	––
3–Nitroaniline	20	0	ND	––	––	––	––
3,3'–Dichlorobenzidine	20	0	ND	––	––	––	––
4–Bromophenyl phenyl ether	20	0	ND	––	––	––	––
4–Chloro–3–methylphenol	20	0	ND	––	––	––	––
4–Chloroaniline	20	0	ND	––	––	––	––
4–Chlorophenyl phenyl ether	20	0	ND	––	––	––	––
4–Methylphenol	20	2	0.10	2.00E–01	2.80E–01	TP–6–02–S	3.2E–01 *
4–Nitroaniline	20	0	ND	––	––	––	––
4–Nitrophenol	20	0	ND	––	––	––	––
4,6–Dinitro–2–methylphenol	20	0	ND	––	––	––	––
Acenaphthene	20	12	0.60	6.50E–02	1.70E+01	09–MW1105	4.6E–01
Acenaphthylene	20	2	0.10	4.70E–02	5.10E–02	09–MW8–04	3.1E–01 *
Anthracene	20	14	0.70	1.30E–01	2.30E+01	09–MW1105	5.1E–01
Benzoic acid	10	0	ND	––	––	––	––
Benzo(a)anthracene	20	16	0.80	1.70E–01	4.10E+01	09–MW1105	1.1E+00
Benzo(a)pyrene	20	15	0.75	1.30E–01	2.20E+01	09–MW1105	9.6E–01
Benzo(b)fluoranthene	12	8	0.67	1.40E–01	4.10E+01	09–MW1105	1.4E+00
Benzo(b/k)fluoranthene	8	7	0.88	3.90E–01	9.50E+00	TP–6–02–S	1.6E+00
Benzo(g,h,i)perylene	20	12	0.60	4.10E–02	1.50E+01	09–MW1105	6.3E–01
Benzo(k)fluoranthene	11	8	0.73	9.20E–02	4.10E+01	09–MW1105	1.5E+00
Benzyl alcohol	10	0	ND	––	––	––	––
Bis(2–chloroethoxy)methane	20	0	ND	––	––	––	––
Bis(2–chloroethyl)ether	20	0	ND	––	––	––	––
Bis(2–chloroisopropyl)ether	20	1	0.05	6.50E–02	6.50E–02	09–MW8–04	3.5E–01 *
Bis(2–ethylhexyl)phthalate	20	12	0.60	6.40E–02	3.30E+01	TP–6–02–S	1.0E+00
Butyl benzyl phthalate	20	7	0.35	5.80E–02	8.30E+00	TP–6–02–S	5.1E–01
Carbazole	10	6	0.60	6.60E–02	1.00E+01	09–MW1105	6.3E–01
Chrysene	20	16	0.80	1.60E–01	2.10E+01	09–MW1105	1.0E+00
Dibenzofuran	20	10	0.50	9.20E–02	1.20E+01	09–MW1105	4.6E–01
Dibenzo(a,h)anthracene	20	9	0.45	9.00E–02	6.40E+00	09–MW1105	5.4E–01
Diethyl phthalate	20	2	0.10	4.30E–02	4.40E–02	09–B7–04	3.2E–01 *
Dimethyl phthalate	20	0	ND	––	––	––	––
Di–n–butyl phthalate	20	6	0.30	5.20E–02	1.30E+00	TP–6–02–S	4.4E–01
Di–n–octyl phthalate	20	0	ND	––	––	––	––
Fluoranthene	20	16	0.80	1.70E–01	9.40E+01	09–MW1105	1.8E+00
Fluorene	20	13	0.65	6.50E–02	1.80E+01	09–MW1105	4.5E–01
Hexachlorobenzene	20	0	ND	––	––	––	––
Hexachlorobutadiene	20	0	ND	––	––	––	––
Hexachlorocyclopentadiene	20	0	ND	––	––	––	––
Hexachloroethane	20	0	ND	––	––	––	––
Indeno(1,2,3–cd)pyrene	20	13	0.65	4.70E–02	1.50E+01	09–MW1105	5.9E–01
Isophorone	20	0	ND	––	––	––	––
Naphthalene	20	13	0.65	9.70E–02	1.90E+01	09–MW1105	5.4E–01
Nitrobenzene	20	0	ND	––	––	––	––
N–Nitroso–di–n–propylamine	20	0	ND	––	––	––	––
N–Nitrosodiphenylamine	20	1	0.05	1.20E–01	1.20E–01	09–B4–05	3.4E–01 *
Pentachlorophenol	20	0	ND	––	––	––	––
Phenanthrene	20	16	0.80	7.80E–02	1.10E+02	09–MW1105	1.4E+00
Phenol	20	1	0.05	7.70E+01	7.70E+01	TP–6–02–S	7.7E–01
Pyrene	20	16	0.80	1.60E–01	8.10E+01	09–MW1105	1.4E+00

TABLE 3-3 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SUBSURFACE SOIL (2 TO 10 FEET)
NCBC DAVISVILLE - SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/kg)
PESTICIDES/PCBs							
4,4'-DDD	20	7	0.35	9.20E-03	3.20E-01	09-B8-04	2.1E-02
4,4'-DDE	20	7	0.35	6.90E-04	8.90E-01	09-B3-03	1.6E-02
4,4'-DDT	20	5	0.25	5.70E-03	6.60E-02	09-B8-04,09-MW5-04	1.6E-02
Aldrin	20	4	0.20	1.70E-03	3.60E-03	09-MW7-02	3.6E-03
Alpha chlordane	20	6	0.30	1.50E-03	1.30E-02	09-B3-03	1.4E-02 *
Alpha-BHC	20	4	0.20	8.90E-05	9.80E-04	09-B3-03	2.1E-03 *
Beta-BHC	20	2	0.10	4.40E-04	4.20E-02	TP-5-06-S	6.2E-03
Delta-BHC	20	1	0.05	6.30E-05	6.30E-05	09-B4-05	2.8E-03 *
Dieldrin	20	4	0.20	3.60E-04	1.20E-02	09-B7-04	5.8E-03
Endosulfan I	20	1	0.05	2.90E-03	2.90E-03	09-B7-04	3.7E-03 *
Endosulfan II	20	2	0.10	4.00E-04	7.20E-02	09-B8-04	1.2E-02
Endosulfan sulfate	20	0	ND	--	--	--	--
Endrin	20	2	0.10	1.40E-03	1.70E-03	09-MW8-04	5.6E-03 *
Endrin aldehyde	10	0	ND	--	--	--	--
Endrin ketone	20	1	0.05	3.50E-03	3.50E-03	09-B4-05	7.0E-03 *
Gamma chlordane	20	6	0.30	3.40E-04	7.60E-03	09-MW7-02	1.1E-02 *
Gamma-BHC (Lindane)	20	0	ND	--	--	--	--
Heptachlor	20	1	0.05	2.00E-04	2.00E-04	09-MW7-07	3.0E-03 *
Heptachlor epoxide	20	1	0.05	2.40E-03	2.40E-03	09-MW8-04	3.6E-03 *
Aroclor-1016	20	0	ND	--	--	--	--
Aroclor-1221	20	0	ND	--	--	--	--
Aroclor-1232	20	0	ND	--	--	--	--
Aroclor-1242	20	0	ND	--	--	--	--
Aroclor-1248	20	0	ND	--	--	--	--
Aroclor-1254	20	1	0.05	2.90E-01	2.90E-01	TP-9-08-3	1.2E-01
Aroclor-1260	20	9	0.45	1.30E-01	1.70E+00	09-B7-04	2.4E-01
p,p'-Methoxychlor	20	1	0.05	8.00E-03	8.00E-03	09-B8-04	2.9E-02 *
Toxaphene	20	0	ND	--	--	--	--

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent

TABLE 3-4
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN GROUND WATER
NCBC DAVISVILLE - SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/l)	Maximum Detected Concentration (mg/l)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/l)
INORGANICS							
Aluminum	27	21	0.78	4.40E-02	3.77E+01	GW-09-04B	3.6E-01
Antimony	27	3	0.11	3.55E-02	7.10E-02	GW-09-02B	3.3E-02
Arsenic	27	8	0.30	4.00E-03	1.49E-02	09-MW7S	4.3E-03
Barium	27	27	1.00	3.30E-03	7.53E-01	09-MW6S	5.1E-02
Beryllium	27	2	0.07	2.10E-03	2.70E-03	GW-09-02B	1.1E-03
Cadmium	27	3	0.11	2.20E-04	5.20E-03	GW-09-02B	3.4E-04
Calcium	27	27	1.00	5.81E+00	1.40E+02	09-MW6S	4.0E+01
Chromium	27	5	0.19	8.70E-03	2.63E-02	09-MW9D	8.0E-03
Cobalt	27	7	0.26	5.50E-03	4.96E-02	GW-09-04B	1.0E-02
Copper	27	14	0.52	4.10E-03	7.20E-02	GW-09-04B	7.5E-03
Cyanide	26	1	0.04	6.20E-03	6.20E-03	09-MW10D	5.0E-03
Iron	27	27	1.00	1.37E-01	4.73E+01	09-MW7D	6.8E+00
Lead	27	7	0.26	2.80E-03	2.55E-02	GW-09-04B	3.4E-03
Magnesium	27	27	1.00	6.63E-01	6.07E+01	09-MW6S	1.0E+01
Manganese	27	27	1.00	4.30E-03	1.91E+00	GW-09-04B	4.2E-01
Mercury	27	5	0.19	2.20E-04	3.20E-04	GW-09-02,03A	2.1E-04
Nickel	27	1	0.04	1.86E-02	1.86E-02	09-MW13S	1.8E-02
Potassium	27	27	1.00	6.81E-01	3.85E+01	09-MW6S	7.2E+00
Selenium	27	0	ND	--	--	--	--
Silver	27	3	0.11	3.60E-04	7.10E-04	09-MW7D	4.2E-04
Sodium	27	27	1.00	2.08E+00	2.30E+02	09-MW7D	2.3E+01
Thallium	27	2	0.07	3.30E-03	3.90E-03	09-MW5S	2.7E-03
Vanadium	27	6	0.22	5.60E-03	2.30E-02	GW-09-04B	7.3E-03
Zinc	27	16	0.59	1.10E-02	1.65E-01	GW-09-02B	2.7E-02
VOLATILES							
1,1-Dichloroethane	27	0	ND	--	--	--	--
1,1-Dichloroethene	27	0	ND	--	--	--	--
1,1,1-Trichloroethane	27	0	ND	--	--	--	--
1,1,2-Trichloroethane	27	1	0.04	4.80E-02	4.80E-02	09-MW9D	1.1E-02
1,1,2,2-Tetrachloroethane	27	1	0.04	9.00E-03	9.00E-03	09-MW9D	1.1E-02
1,2-Dichloroethane	27	3	0.11	2.00E-03	3.20E-01	09-MW7D	9.6E-03
1,2-Dichloroethene(Total)	27	15	0.56	1.00E-03	2.80E+01	09-MW7D	1.4E-02
1,2-Dichloropropane	27	3	0.11	2.00E-03	9.40E-01	09-MW6S	1.1E-02
2-Butanone	27	1	0.04	4.50E+00	4.50E+00	09-MW7D	1.4E-02
2-Hexanone	27	0	ND	--	--	--	--
4-Methyl-2-pentanone	27	0	ND	--	--	--	--
Acetone	27	2	0.07	8.00E-03	3.00E+00	09-MW7D	1.4E-02
Benzene	27	8	0.30	1.00E-03	1.05E-02	09-MW7S	7.7E-03
Bromodichloromethane	27	0	ND	--	--	--	--
Bromoform	27	0	ND	--	--	--	--
Bromomethane	27	0	ND	--	--	--	--
Carbon disulfide	27	0	ND	--	--	--	--
Carbon tetrachloride	27	0	ND	--	--	--	--
Chlorobenzene	27	6	0.22	1.00E-03	6.20E-01	09-MW11S	1.2E-02
Chloroethane	27	1	0.04	5.00E-03	5.00E-03	09-MW8S	6.9E-03 *
Chloroform	27	0	ND	--	--	--	--
Chloromethane	27	0	ND	--	--	--	--
Cis-1,3-Dichloropropene	27	0	ND	--	--	--	--
Dibromochloromethane	27	0	ND	--	--	--	--
Ethylbenzene	27	4	0.15	9.00E-03	8.70E-02	09-MW2S	1.3E-02
Methylene chloride	27	0	ND	--	--	--	--
Styrene	27	0	ND	--	--	--	--
Tetrachloroethene	27	1	0.04	6.70E-01	6.70E-01	09-MW6S	1.2E-02
Toluene	27	3	0.11	2.00E-03	2.80E-02	09-MW5S	1.0E-02
Trans-1,3-Dichloropropene	27	0	ND	--	--	--	--
Trichloroethene	27	7	0.26	1.00E-03	1.20E+00	09-MW7D	1.0E-02
Vinyl acetate	8	0	ND	--	--	--	--
Vinyl chloride	27	7	0.26	3.00E-03	7.00E+00	09-MW7D	1.4E-02
Xylenes (Total)	27	5	0.19	3.00E-03	1.90E-01	09-MW2S	1.4E-02

TABLE 3–4 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN GROUND WATER
NCBC DAVISVILLE – SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/l)	Maximum Detected Concentration (mg/l)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/l)
SEMIVOLATILES							
1,2–Dichlorobenzene	27	2	0.07	1.00E–03	8.00E–03	09–MW11S	1.1E–02 *
1,2,4–Trichlorobenzene	27	1	0.04	8.00E–03	8.00E–03	09–MW11S	1.2E–02 *
1,3–Dichlorobenzene	27	1	0.04	8.30E–02	8.30E–02	09–MW11S	1.3E–02
1,4–Dichlorobenzene	27	2	0.07	5.00E–03	4.20E–01	09–MW11S	1.3E–02
2–Chloronaphthalene	27	0	ND	––	––	––	––
2–Chlorophenol	27	1	0.04	3.00E–03	3.00E–03	09–MW11S	5.9E–03 *
2–Methylnaphthalene	27	4	0.15	3.00E–03	2.50E–02	09–MW5S	1.1E–02
2–Methylphenol	26	2	0.08	7.30E–02	3.50E–01	09–MW6S	1.2E–02
2–Nitroaniline	27	0	ND	––	––	––	––
2–Nitrophenol	27	0	ND	––	––	––	––
2,4–Dichlorophenol	27	1	0.04	4.00E–03	4.00E–03	09–MW11S	6.0E–03 *
2,4–Dimethylphenol	27	5	0.19	1.00E–03	8.60E–01	09–MW6S	1.2E–02
2,4–Dinitrophenol	27	0	ND	––	––	––	––
2,4–Dinitrotoluene	27	0	ND	––	––	––	––
2,4,5–Trichlorophenol	27	0	ND	––	––	––	––
2,4,6–Trichlorophenol	27	0	ND	––	––	––	––
2,6–Dinitrotoluene	27	0	ND	––	––	––	––
3–Nitroaniline	27	0	ND	––	––	––	––
3,3'–Dichlorobenzidine	27	0	ND	––	––	––	––
4–Bromophenyl phenyl ether	27	0	ND	––	––	––	––
4–Chloro–3–methylphenol	27	0	ND	––	––	––	––
4–Chloroaniline	27	0	ND	––	––	––	––
4–Chlorophenyl phenyl ether	27	0	ND	––	––	––	––
4–Methylphenol	26	2	0.08	2.10E–01	3.70E–01	09–MW6S	1.3E–02
4–Nitroaniline	27	0	ND	––	––	––	––
4–Nitrophenol	27	2	0.07	1.00E–03	3.00E–03	09–MW12D	1.6E–02 *
4,6–Dinitro–2–methylphenol	27	0	ND	––	––	––	––
Acenaphthene	27	2	0.07	5.00E–03	6.60E–02	09–MW5S	1.2E–02
Acenaphthylene	27	0	ND	––	––	––	––
Anthracene	27	1	0.04	2.20E–02	2.20E–02	09–MW5S	1.2E–02
Benzoic acid	8	0	ND	––	––	––	––
Benzo(a)anthracene	27	0	ND	––	––	––	––
Benzo(a)pyrene	27	0	ND	––	––	––	––
Benzo(b)fluoranthene	27	0	ND	––	––	––	––
Benzo(b/k)fluoranthene	0	0	ND	––	––	––	––
Benzo(g,h,i)perylene	27	0	ND	––	––	––	––
Benzo(k)fluoranthene	27	0	ND	––	––	––	––
Benzyl alcohol	8	0	ND	––	––	––	––
Bis(2–chloroethoxy)methane	27	0	ND	––	––	––	––
Bis(2–chloroethyl)ether	27	6	0.22	1.00E–03	1.40E–02	09–MW7D	8.2E–03
Bis(2–chloroisopropyl)ether	27	3	0.11	2.00E–03	3.00E–03	GW–09–03B;09–MW3D	5.6E–03 *
Bis(2–ethylhexyl)phthalate	27	0	ND	––	––	––	––
Butyl benzyl phthalate	27	0	ND	––	––	––	––
Carbazole	27	1	0.04	1.05E–02	1.05E–02		1.2E–02 *
Chrysene	27	0	ND	––	––	––	––
Dibenzofuran	27	2	0.07	2.00E–03	2.40E–02	09–MW5S	1.1E–02
Dibenzo(a,h)anthracene	27	0	ND	––	––	––	––
Diethyl phthalate	27	2	0.07	2.00E–03	2.00E–03	09–MW9D,13D	5.6E–03 *
Dimethyl phthalate	27	0	ND	––	––	––	––
Di–n–butyl phthalate	27	1	0.04	1.00E–03	1.00E–03	09–MW2S	5.7E–03 *
Di–n–octyl phthalate	27	0	ND	––	––	––	––
Fluoranthene	27	1	0.04	2.00E–03	2.00E–03	09–MW5S	5.8E–03 *
Fluorene	27	2	0.07	3.00E–03	2.30E–02	09–MW5S	1.2E–02
Hexachlorobenzene	27	0	ND	––	––	––	––
Hexachlorobutadiene	27	0	ND	––	––	––	––
Hexachlorocyclopentadiene	27	0	ND	––	––	––	––
Hexachloroethane	27	1	0.04	3.00E–03	3.00E–03	09–MW2S	5.9E–03 *
Indeno(1,2,3–cd)pyrene	27	0	ND	––	––	––	––
Isophorone	27	0	ND	––	––	––	––
Naphthalene	27	6	0.22	1.00E–03	4.70E–02	09–MW5S	1.1E–02
Nitrobenzene	27	0	ND	––	––	––	––
N–Nitroso–di–n–propylamine	27	1	0.04	1.00E–03	1.00E–03	09–MW4S	1.1E–02 *
N–Nitrosodiphenylamine	27	0	ND	––	––	––	––
Pentachlorophenol	27	1	0.04	2.00E–03	2.00E–03	09–MW7S	1.6E–02 *
Phenanthrene	27	1	0.04	2.10E–02	2.10E–02	09–MW5S	1.2E–02
Phenol	26	2	0.08	2.00E–03	6.60E–02	09–MW6S	1.1E–02
Pyrene	27	1	0.04	3.00E–03	3.00E–03	09–MW5S	5.9E–03 *

TABLE 3-4 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN GROUND WATER
NCBC DAVISVILLE - SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/l)	Maximum Detected Concentration (mg/l)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/l)
PESTICIDES/PCBs							
4,4'-DDD	27	1	0.04	3.70E-06	3.70E-06	09-MW9S	4.5E-05 *
4,4'-DDE	27	0	ND	--	--	--	--
4,4'-DDT	27	0	ND	--	--	--	--
Aldrin	27	0	ND	--	--	--	--
Alpha chlordane	27	1	0.04	1.20E-05	1.20E-05	09-MW5S	4.8E-05 *
Alpha-BHC	27	0	ND	--	--	--	--
Beta-BHC	27	0	ND	--	--	--	--
Delta-BHC	27	0	ND	--	--	--	--
Dieldrin	27	2	0.07	2.40E-06	2.40E-06	09-MW9S,9D	4.0E-05 *
Endosulfan I	27	0	ND	--	--	--	--
Endosulfan II	27	0	ND	--	--	--	--
Endosulfan sulfate	27	0	ND	--	--	--	--
Endrin	27	0	ND	--	--	--	--
Endrin aldehyde	19	0	ND	--	--	--	--
Endrin ketone	27	0	ND	--	--	--	--
Gamma chlordane	27	0	ND	--	--	--	--
Gamma-BHC (Lindane)	27	0	ND	--	--	--	--
Heptachlor	27	0	ND	--	--	--	--
Heptachlor epoxide	27	0	ND	--	--	--	--
Aroclor-1016	27	0	ND	--	--	--	--
Aroclor-1221	27	0	ND	--	--	--	--
Aroclor-1232	27	0	ND	--	--	--	--
Aroclor-1242	27	0	ND	--	--	--	--
Aroclor-1248	27	0	ND	--	--	--	--
Aroclor-1254	27	0	ND	--	--	--	--
Aroclor-1260	27	0	ND	--	--	--	--
p,p'-Methoxychlor	27	0	ND	--	--	--	--
Toxaphene	27	0	ND	--	--	--	--

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent

TABLE 3-5
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SURFACE WATER
NCBC DAVISVILLE – SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/l)	Maximum Detected Concentration (mg/l)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/l)
INORGANICS							
Aluminum	4	1	0.25	3.4E-01	3.4E-01	09-SW04	3.7E-01 *
Antimony	4	0	ND	--	--	--	--
Arsenic	4	1	0.25	4.2E-03	4.2E-03	09-SW10	3.3E-03
Barium	4	0	ND	--	--	--	--
Beryllium	4	0	ND	--	--	--	--
Cadmium	4	0	ND	--	--	--	--
Calcium	4	4	1.00	1.2E+01	6.8E+01	09-SW10	2.1E+01
Chromium	4	1	0.25	1.2E-02	1.2E-02	09-SW10	8.8E-03
Cobalt	4	0	ND	--	--	--	--
Copper	4	0	ND	--	--	--	--
Cyanide	4	0	ND	--	--	--	--
Iron	4	4	1.00	5.8E-01	7.3E+00	09-SW10	1.6E+00
Lead	4	0	ND	--	--	--	--
Magnesium	4	4	1.00	8.1E+00	1.9E+02	09-SW10	3.2E+01
Manganese	4	4	1.00	4.1E-02	1.4E-01	09-SW10	7.2E-02
Mercury	4	0	ND	--	--	--	--
Nickel	4	0	ND	--	--	--	--
Potassium	4	4	1.00	5.4E+00	6.9E+01	09-SW10	1.4E+01
Selenium	4	0	ND	--	--	--	--
Silver	4	0	ND	--	--	--	--
Sodium	4	4	1.00	6.0E+01	1.8E+03	09-SW10	2.7E+02
Thallium	4	0	ND	--	--	--	--
Vanadium	4	1	0.25	1.2E-02	1.2E-02	09-SW10	7.2E-03
Zinc	4	0	ND	--	--	--	--
VOLATILES							
Acetone	4	0	ND	--	--	--	--
Benzene	4	0	ND	--	--	--	--
Bromodichloromethane	4	0	ND	--	--	--	--
Bromoform	4	0	ND	--	--	--	--
Bromomethane	4	0	ND	--	--	--	--
Butanone, 2-	4	0	ND	--	--	--	--
Carbon disulfide	4	1	0.25	2.0E-03	2.0E-03	09-SW09	4.0E-03 *
Carbon tetrachloride	4	0	ND	--	--	--	--
Chlorobenzene	4	0	ND	--	--	--	--
Chloroethane	4	0	ND	--	--	--	--
Chloroform	4	0	ND	--	--	--	--
Chloromethane	4	0	ND	--	--	--	--
Dibromochloromethane	4	0	ND	--	--	--	--
Dichloroethane, 1,1-	4	0	ND	--	--	--	--
Dichloroethane, 1,2-	4	0	ND	--	--	--	--
Dichloroethene, 1,2- (total)	4	1	0.25	6.0E-03	6.0E-03	09-SW10	5.2E-03
Dichloroethene, 1,1-	4	0	ND	--	--	--	--
Dichloropropane, 1,2-	4	0	ND	--	--	--	--
Dichloropropene, cis-1,3-	4	0	ND	--	--		--
Dichloropropene, trans-1,3-	4	0	ND	--	--		--
Ethylbenzene	4	0	ND	--	--	--	--
Hexanone, 2-	4	0	ND	--	--	--	--
Methyl-2-pentanone, 4-	4	0	ND	--	--	--	--
Methylene chloride	4	0	ND	--	--	--	--
Styrene	4	0	ND	--	--	--	--
Tetrachloroethane, 1,1,2,2-	4	1	0.25	3.0E-03	3.0E-03	09-SW10	4.4E-03 *
Tetrachloroethene	4	0	ND	--	--	--	--
Toluene	4	0	ND	--	--	--	--
Trichloroethane, 1,1,1-	4	0	ND	--	--	--	--
Trichloroethane, 1,1,2-	4	0	ND	--	--	--	--
Trichloroethene	4	1	0.25	2.0E-03	2.0E-03	09-SW10	4.0E-03 *
Vinyl chloride	4	0	ND	--	--	--	--
Xylenes (Total)	4	0	ND	--	--	--	--

TABLE 3-5 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SURFACE WATER
NCBC DAVISVILLE - SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/l)	Maximum Detected Concentration (mg/l)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/l)
SEMIVOLATILES							
Acenaphthene	4	0	ND	--	--	--	--
Acenaphthylene	4	0	ND	--	--	--	--
Anthracene	4	0	ND	--	--	--	--
Benzo(a)anthracene	4	0	ND	--	--	--	--
Benzo(a)pyrene	4	0	ND	--	--	--	--
Benzo(b)fluoranthene	4	0	ND	--	--	--	--
Benzo(g,h,i)perylene	4	0	ND	--	--	--	--
Benzo(k)fluoranthene	4	0	ND	--	--	--	--
Bis(2-chloroethoxy)methane	4	0	ND	--	--	--	--
Bis(2-chloroethyl)ether	4	0	ND	--	--	--	--
Bis(2-chloroisopropyl)ether	4	0	ND	--	--	--	--
Bis(2-ethylhexyl)phthalate	4	0	ND	--	--	--	--
Bromophenyl phenyl ether, 4-	4	0	ND	--	--	--	--
Butyl benzyl phthalate	4	0	ND	--	--	--	--
Carbazole	4	0	ND	--	--	--	--
Chloro-3-methylphenol, 4-	4	0	ND	--	--	--	--
Chloroaniline, 4-	4	0	ND	--	--	--	--
Chloronaphthalene, 2-	4	0	ND	--	--	--	--
Chlorophenol, 2-	4	0	ND	--	--	--	--
Chlorophenyl phenyl ether, 4-	4	0	ND	--	--	--	--
Chrysene	4	0	ND	--	--	--	--
Dibenzofuran	4	0	ND	--	--	--	--
Dibenzo(a,h)anthracene	4	0	ND	--	--	--	--
Dichlorobenzene1 1,3-	4	0	ND	--	--	--	--
Dichlorobenzene, 1,2-	4	0	ND	--	--	--	--
Dichlorobenzene, 1,4-	4	0	ND	--	--	--	--
Dichlorobenzidine, 3,3'-	4	0	ND	--	--	--	--
Dichlorophenol, 2,4-	4	0	ND	--	--	--	--
Diethyl phthalate	4	0	ND	--	--	--	--
Dimethyl phthalate	4	0	ND	--	--	--	--
Dimethylphenol, 2,4-	4	0	ND	--	--	--	--
Di-n-butyl phthalate	4	0	ND	--	--	--	--
Dinitro-2-methylphenol, 4,6-	4	0	ND	--	--	--	--
Dinitrophenol, 2,4-	4	0	ND	--	--	--	--
Dinitrotoluene, 2,4-	4	0	ND	--	--	--	--
Dinitrotoluene, 2,6-	4	0	ND	--	--	--	--
Di-n-octyl phthalate	4	0	ND	--	--	--	--
Fluoranthene	4	0	ND	--	--	--	--
Fluorene	4	0	ND	--	--	--	--
Hexachlorobenzene	4	0	ND	--	--	--	--
Hexachlorobutadiene	4	0	ND	--	--	--	--
Hexachlorocyclopentadiene	4	0	ND	--	--	--	--
Hexachloroethane	4	0	ND	--	--	--	--
Indeno(1,2,3-cd)pyrene	4	0	ND	--	--	--	--
Isophorone	4	0	ND	--	--	--	--
Methylnaphthalene, 2-	4	0	ND	--	--	--	--
Methylphenol, 2-	4	0	ND	--	--	--	--
Methylphenol, 4-	4	0	ND	--	--	--	--
Naphthalene	4	0	ND	--	--	--	--
Nitroaniline, 2-	4	0	ND	--	--	--	--
Nitroaniline, 3-	4	0	ND	--	--	--	--
Nitroaniline, 4-	4	0	ND	--	--	--	--
Nitrobenzene	4	0	ND	--	--	--	--
Nitrophenol, 2-	4	0	ND	--	--	--	--
Nitrophenol, 4-	4	0	ND	--	--	--	--
Nitroso-di-n-propylamine, n-	4	0	ND	--	--	--	--
Nitrosodiphenylamine, n-	4	0	ND	--	--	--	--
Pentachlorophenol	4	0	ND	--	--	--	--
Phenanthrene	4	0	ND	--	--	--	--
Phenol	4	0	ND	--	--	--	--
Pyrene	4	0	ND	--	--	--	--
Trichlorobenzene, 1,2,4-	4	0	ND	--	--	--	--
Trichlorophenol, 2,4,5-	4	0	ND	--	--	--	--
Trichlorophenol, 2,4,6-	4	0	ND	--	--	--	--

TABLE 3-5 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SURFACE WATER
NCBC DAVISVILLE – SITE 09

Constituent	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/l)	Maximum Detected Concentration (mg/l)	Location(s) of Maximum Detect	Geometric Mean Concentration (mg/l)
PESTICIDES/PCBs							
Aldrin	4	0	ND	--	--	--	--
BHC, alpha-	4	0	ND	--	--	--	--
BHC, beta-	4	0	ND	--	--	--	--
BHC, delta-	4	0	ND	--	--	--	--
BHC, gamma- (Lindane)	4	0	ND	--	--	--	--
Chlordane, alpha-	4	0	ND	--	--	--	--
Chlordane, gamma-	4	0	ND	--	--	--	--
DDD, 4,4'-	4	0	ND	--	--	--	--
DDE, 4,4'-	4	0	ND	--	--	--	--
DDT, 4,4'-	4	0	ND	--	--	--	--
Dieldrin	4	0	ND	--	--	--	--
Endosulfan I	4	0	ND	--	--	--	--
Endosulfan II	4	0	ND	--	--	--	--
Endosulfan sulfate	4	0	ND	--	--	--	--
Endrin	4	0	ND	--	--	--	--
Endrin aldehyde	4	0	ND	--	--	--	--
Endrin ketone	4	0	ND	--	--	--	--
Heptachlor	4	0	ND	--	--	--	--
Heptachlor epoxide	4	0	ND	--	--	--	--
Methoxychlor, p,p'-	4	0	ND	--	--	--	--
Toxaphene	4	0	ND	--	--		--
Aroclor-1016	4	0	ND	--	--	--	--
Aroclor-1221	4	0	ND	--	--	--	--
Aroclor-1232	4	0	ND	--	--	--	--
Aroclor-1242	4	0	ND	--	--	--	--
Aroclor-1248	4	0	ND	--	--	--	--
Aroclor-1254	4	0	ND	--	--	--	--
Aroclor-1260	4	0	ND	--	--	--	--

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent

TABLE 3-6
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SHELLFISH COLLECTED IN ALLEN HARBOR (CLAMS) (a)
NCBC DAVISVILLE – SITE 09

	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location of Maximum Detected Concentration	Geometric Mean Concentration (mg/kg)
INORGANICS							
Arsenic	28	28	1.00	2.71E-01	8.61E-01	AH	4.8E-01
Cadmium	28	28	1.00	3.55E-02	1.38E-01	AH3	7.3E-02
Chromium	28	28	1.00	1.08E-02	6.46E-01	AH7	7.4E-02
Copper	28	28	1.00	1.11E+00	5.95E+00	AH12	2.1E+00
Iron	28	28	1.00	1.70E+01	1.31E+03	AH	4.2E+01
Lead	28	28	1.00	6.48E-02	4.30E+00	AH	1.9E-01
Manganese	28	28	1.00	3.65E-01	1.22E+01	AH3	3.5E+00
Mercury	4	3	0.75	7.05E-03	8.90E-03	AH2	8.4E-03
Nickel	28	28	1.00	1.39E-01	2.18E+00	AH7	9.0E-01
Silver	9	9	1.00	8.93E-02	1.98E-01	AH14	1.4E-01
Zinc	28	28	1.00	6.54E+00	2.06E+01	AH12	1.3E+01
SEMIVOLATILES							
Anthracene	28	27	0.96	2.32E-04	1.33E-03	AH3, FDA	5.6E-04
Benzofluoranthene	28	28	1.00	1.20E-03	1.21E-02	AH	3.0E-03
Benzotriazole	28	28	1.00	4.81E-03	8.15E-02	AH7	2.1E-02
Benzotriazole, chlorinated	28	28	1.00	1.39E-03	8.42E-03	AH7	3.1E-03
Benzo(a)anthracene	28	28	1.00	4.12E-04	7.75E-03	AH14	1.9E-03
Benzo(a)pyrene	28	28	1.00	2.81E-04	4.44E-03	AH	6.5E-04
Benzo(e)pyrene	28	28	1.00	6.92E-04	7.13E-03	AH	1.8E-03
Benzo(ghi)perylene	28	27	0.96	1.29E-04	4.30E-03	AH14	4.9E-04
Chrysene & Triphenylene	28	28	1.00	8.78E-04	8.70E-03	FDA	3.4E-03
Coronene	28	14	0.50	1.04E-04	5.22E-04	AH3	1.7E-04
Dibenzo(a,h)anthracene	28	26	0.93	5.82E-05	1.28E-03	AH14	2.8E-04
Fluoranthene	28	28	1.00	1.71E-03	4.08E-02	AH3	1.5E-02
Fluorene	28	27	0.96	2.72E-04	1.44E-03	AH14	5.8E-04
Indeno(1,2,3-cd)pyrene	28	28	1.00	2.00E-04	2.62E-03	AH	4.9E-04
MW=178, C1-homologs	28	28	1.00	7.81E-04	1.94E-02	FDA	3.5E-03
MW=178, C2-homologs	28	28	1.00	8.03E-04	4.33E-02	FDA	5.4E-03
MW=178, C3-homologs	28	28	1.00	6.10E-04	3.74E-02	FDA	3.6E-03
MW=178, C4-homologs	28	27	0.96	2.18E-04	1.23E-02	FDA	9.8E-04
MW=228	19	19	1.00	1.39E-03	1.06E-02	AH	4.6E-03
MW=252	0	0	ND	--	--	--	--
MW=276	28	27	0.96	2.76E-04	6.96E-03	AH	1.1E-03
MW=278	28	28	1.00	8.97E-07	2.33E-03	FDA	6.7E-04
MW=302	28	21	0.75	1.23E-04	1.67E-03	AH12	4.1E-04
Perylene	28	28	1.00	1.62E-04	2.27E-03	AH	4.1E-04
Phenanthrene	28	28	1.00	4.70E-04	7.75E-03	FDA	2.1E-03
Pyrene	28	28	1.00	2.00E-03	2.84E-02	AH3	1.3E-02
PAHs (total parent)	9	9	1.00	3.91E-02	1.09E-01	FDA	8.0E-02
PESTICIDES/PCBs							
BHC, alpha-	26	21	0.81	5.25E-05	8.02E-05	AH2, AH7	6.1E-05
BHC, gamma-	26	20	0.77	3.61E-05	1.28E-04	AH2	6.2E-05
Chlordane, alpha-	26	22	0.85	1.04E-04	4.17E-04	AH3	1.8E-04
Chlordane, gamma-	26	25	0.96	1.57E-04	5.36E-04	AH3	2.0E-04
DDD, p,p'-	26	23	0.88	1.91E-04	6.97E-03	AH14	3.3E-04
DDE, p,p'-	26	24	0.92	2.70E-05	9.55E-04	AH3	1.8E-04
DDT, p,p'-	26	21	0.81	3.39E-05	1.13E-03	AH7	1.2E-04
Hexachlorobenzene	26	24	0.92	4.53E-05	1.47E-04	AH	7.6E-05
Aroclor-1242	28	11	0.39	1.19E-04	2.31E-03	AH14	8.7E-04
Aroclor-1254	28	28	1.00	1.26E-02	1.09E-01	AH12	3.7E-02

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent
(a) Includes the following samples locations; AH, AH2, AH3, AH5, AH7, AH8, AH10, AH13, AH14, and FDA

TABLE 3-6 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SHELLFISH COLLECTED IN ALLEN HARBOR (MUSSELS) (a)
NCBC DAVISVILLE – SITE 09

	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location of Maximum Detected Concentration	Geometric Mean Concentration (mg/kg)
INORGANICS							
Arsenic	20	20	1.00	2.95E−01	6.45E−01	AH5	4.0E−01
Cadmium	20	20	1.00	6.34E−02	2.29E−01	AH5	1.2E−01
Chromium	20	20	1.00	8.51E−02	4.53E−01	AH5	1.5E−01
Copper	20	20	1.00	4.57E−01	2.16E+00	AH2	1.1E+00
Iron	20	20	1.00	3.59E+01	1.30E+02	AH7	6.5E+01
Lead	20	20	1.00	2.45E−01	6.14E−01	AH2	4.5E−01
Manganese	20	20	1.00	1.96E+00	1.19E+01	AH2	4.5E+00
Mercury	0	0	ND	−−	−−		−−
Nickel	20	20	1.00	6.79E−02	8.33E−01	AH5	2.4E−01
Silver	2	2	1.00	2.58E−02	2.63E−02	AH5	2.6E−02
Zinc	20	20	1.00	5.57E+00	2.28E+01	AH5	1.1E+01
SEMIVOLATILES							
Anthracene	20	20	1.00	8.31E−04	2.93E−03	AH7	1.5E−03
Benzofluoranthene	20	20	1.00	2.80E−03	8.37E−03	AH7	5.9E−03
Benzotriazole	20	20	1.00	2.02E−02	1.09E−01	AH7	4.5E−02
Benzotriazole, chlorinated	20	20	1.00	2.71E−03	1.85E−02	AH7	5.2E−03
Benzo(a)anthracene	20	20	1.00	8.95E−04	6.05E−03	AH7	2.8E−03
Benzo(a)pyrene	20	20	1.00	4.38E−04	1.14E−03	AH7	7.6E−04
Benzo(e)pyrene	20	20	1.00	3.34E−03	7.36E−03	AH5	5.3E−03
Benzo(ghi)perylene	20	20	1.00	4.13E−04	1.82E−03	AH5	9.0E−04
Chrysene & Triphenylene	20	20	1.00	4.67E−03	1.17E−02	AH7	8.1E−03
Coronene	20	9	0.45	1.02E−04	4.50E−04	AH5	1.5E−04
Dibenzo(a,h)anthracene	20	19	0.95	1.56E−04	4.53E−04	AH7	2.7E−04
Fluoranthene	20	20	1.00	2.44E−02	8.87E−02	AH5	4.9E−02
Fluorene	20	20	1.00	4.45E−04	3.68E−03	AH7	1.4E−03
Indeno(1,2,3-cd)pyrene	20	20	1.00	2.82E−04	1.08E−03	AH5	6.0E−04
MW=178, C1−homologs	20	20	1.00	3.70E−03	1.69E−02	AH7	6.9E−03
MW=178, C2−homologs	20	20	1.00	6.23E−03	1.84E−02	AH7	1.1E−02
MW=178, C3−homologs	20	20	1.00	4.82E−03	1.22E−02	AH7	8.7E−03
MW=178, C4−homologs	20	20	1.00	1.32E−03	4.24E−03	AH7	2.5E−03
MW=228	18	18	1.00	6.99E−03	2.00E−02	AH7	1.2E−02
MW=252	0	0	ND	−−	−−		−−
MW=276	20	20	1.00	9.22E−04	4.26E−03	AH5	1.9E−03
MW=278	20	20	1.00	4.99E−04	1.87E−03	AH7	9.8E−04
MW=302	20	13	0.65	1.08E−04	1.62E−03	AH7	2.1E−04
Perylene	20	20	1.00	4.38E−04	1.37E−03	AH2	8.1E−04
Phenanthrene	20	20	1.00	9.24E−04	1.32E−02	AH7	3.5E−03
Pyrene	20	20	1.00	1.98E−02	6.13E−02	AH5	3.4E−02
PAHs (total parent)	2	2	1.00	1.66E−01	1.97E−01	AH7	1.8E−01
PESTICIDES/PCBs							
BHC, alpha−	20	20	1.00	6.29E−05	3.00E−04	AH2	1.6E−04
BHC, gamma−	20	20	1.00	7.39E−05	5.55E−04	AH2	1.7E−04
Chlordane, alpha−	20	19	0.95	3.37E−04	1.65E−03	AH2	7.5E−04
Chlordane, gamma−	20	20	1.00	3.12E−04	1.77E−03	AH5	8.3E−04
DDD, p,p'−	20	20	1.00	7.30E−04	2.87E−03	AH5	1.7E−03
DDE, p,p'−	20	20	1.00	5.15E−04	2.71E−03	AH5	1.0E−03
DDT, p,p'−	20	20	1.00	6.30E−05	6.28E−04	AH5	2.2E−04
Hexachlorobenzene	20	20	1.00	4.85E−05	1.46E−04	AH5	8.0E−05
Aroclor−1242	20	20	1.00	1.22E−03	9.64E−03	AH5	4.7E−03
Aroclor−1254	20	20	1.00	7.58E−02	1.95E−01	AH5	1.2E−01

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent
(a) Includes the following samples locations; AH, AH2, AH5, and AH7

TABLE 3–6 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SHELLFISH COLLECTED IN ALLEN HARBOR (OYSTERS) (a)
NCBC DAVISVILLE – SITE 09

	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location of Maximum Detected Concentration	Geometric Mean Concentration (mg/kg)
INORGANICS							
Arsenic	3	3	1.00	2.43E–01	3.95E–01	LANDS	3.2E–01
Cadmium	3	3	1.00	3.61E–01	6.45E–01	LANDM	5.2E–01
Chromium	3	3	1.00	3.63E–02	5.32E–02	LANDM	4.6E–02
Copper	3	3	1.00	4.60E+01	1.05E+02	LANDM	7.9E+01
Iron	3	3	1.00	6.97E+01	1.13E+02	LANDM	9.4E+01
Lead	3	3	1.00	1.13E–01	2.53E–01	LANDN	1.7E–01
Manganese	3	3	1.00	7.65E–01	1.28E+00	LANDN	1.1E+00
Mercury	0	0	ND	––	––		––
Nickel	3	3	1.00	2.19E–01	4.44E–01	LANDS	2.8E–01
Silver	3	3	1.00	5.00E–02	7.06E–01	LANDN	1.5E–01
Zinc	3	3	1.00	4.34E+02	5.44E+02	LANDS	5.0E+02
SEMIVOLATILES							
Anthracene	3	3	1.00	7.08E–04	9.61E–04	LANDM	8.4E–04
Benzofluoranthene	3	3	1.00	2.25E–03	3.00E–03	LANDS	2.7E–03
Benzotriazole	3	3	1.00	7.09E–04	2.07E–03	LANDN	1.4E–03
Benzotriazole, chlorinated	3	3	1.00	5.59E–04	7.45E–04	LANDN/M	6.6E–04
Benzo(a)anthracene	3	3	1.00	4.28E–03	7.21E–03	LANDS	5.8E–03
Benzo(a)pyrene	3	3	1.00	1.54E–04	2.16E–04	LANDM	1.7E–04
Benzo(e)pyrene	3	3	1.00	1.51E–03	2.34E–03	LANDN	1.8E–03
Benzo(ghi)perylene	3	3	1.00	9.01E–05	2.29E–04	LANDN	1.4E–04
Chrysene & Triphenylene	3	3	1.00	8.46E–03	1.24E–02	LANDN	1.0E–02
Coronene	3	3	1.00	2.45E–05	7.24E–05	LANDN	4.5E–05
Dibenzo(a,h)anthracene	3	3	1.00	2.74E–05	4.50E–05	LANDM	3.3E–05
Fluoranthene	3	3	1.00	4.03E–02	6.05E–02	LANDN	4.9E–02
Fluorene	3	3	1.00	1.32E–03	1.56E–03	LANDN	1.4E–03
Indeno(1,2,3–cd)pyrene	3	3	1.00	2.82E–05	8.33E–05	LANDN	4.8E–05
MW=178, C1–homologs	3	3	1.00	4.66E–03	8.60E–03	LANDN	6.3E–03
MW=178, C2–homologs	3	3	1.00	1.02E–02	1.83E–02	LANDN	1.3E–02
MW=178, C3–homologs	3	3	1.00	5.12E–03	9.55E–03	LANDN	6.7E–03
MW=178, C4–homologs	3	3	1.00	1.57E–03	2.70E–03	LANDN	2.0E–03
MW=228	0	0	ND	––	––		––
MW=252	0	0	ND	––	––		––
MW=276	3	3	1.00	3.26E–04	6.32E–04	LANDN/M	5.0E–04
MW=278	3	3	1.00	2.48E–04	3.08E–04	LANDM	2.7E–04
MW=302	3	3	1.00	2.39E–04	3.60E–04	LANDN	3.1E–04
Perylene	3	3	1.00	1.29E–04	2.52E–04	LANDN	1.8E–04
Phenanthrene	3	3	1.00	4.14E–03	5.17E–03	LANDN	4.6E–03
Pyrene	3	3	1.00	1.90E–02	3.00E–02	LANDN	2.4E–02
PAHs (total parent)	3	3	1.00	8.93E–02	1.27E–01	LANDN	1.1E–01
PESTICIDES/PCBs							
BHC, alpha–	3	3	1.00	1.12E–04	1.29E–04	LANDM	1.2E–04
BHC, gamma–	3	3	1.00	7.28E–05	9.80E–05	LANDM	8.3E–05
Chlordane, alpha–	3	3	1.00	1.27E–03	1.57E–03	LANDN	1.4E–03
Chlordane, gamma–	3	3	1.00	1.27E–03	1.68E–03	LANDN	1.5E–03
DDD, p,p'–	3	3	1.00	1.87E–04	1.14E–03	LANDN	5.2E–04
DDE, p,p'–	3	3	1.00	3.26E–03	4.81E–03	LANDM	3.9E–03
DDT, p,p'–	3	3	1.00	3.53E–03	4.36E–03	LANDN	4.0E–03
Hexachlorobenzene	3	1	0.33	2.84E–05	2.84E–05	LANDN	3.7E–05 *
Aroclor–1242	3	3	1.00	4.20E–03	7.80E–03	LANDM	5.7E–03
Aroclor–1254	3	3	1.00	1.75E–01	1.92E–01	LANDS	1.8E–01

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent
(a) Includes the following samples locations; LANDM, LANDN, and LANDS

TABLE 3-7
CONSTITUENTS OF POTENTIAL CONCERN
NCBC DAVISVILLE – SITE 09

62 SURFACE SOIL	64 SUBSURFACE SOIL	43 GROUND WATER	9 SURFACE WATER
17 INORGANICS Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel Selenium Silver Vanadium Zinc 5 VOLATILES Acetone Chloroform Tetrachloroethene Toluene Trichloroethane, 1,1,1– 24 SEMIVOLATILES Acenaphthene Acenaphthylene Anthracene Benzoic acid Benzo(a)anthracene Benzo(a)pyrene Benzo(b/k)fluoranthene Benzo(ghi)perylene Bis(2–ethylhexyl)phthalate Butyl benzyl phthalate Carbazole Chrysene Dibenzofuran Dibenzo(a,h)anthracene Di–n–butyl phthalate Fluoranthene Fluorene Indeno(1,2,3–cd)pyrene Methylnaphthalene, 2– Naphthalene Phenanthrene Pyrene TCDD, 2,3,7,8– (a)	16 INORGANICS Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel Silver Thallium Vanadium Zinc 10 VOLATILES Acetone Benzene Butanone, 2– Chlorobenzene Chloroform Ethylbenzene Tetrachloroethene Toluene Trichloroethene Xylenes (Total) 26 SEMIVOLATILES Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b/k)fluoranthene Benzo(ghi)perylene Bis(2–ethylhexyl)phthalate Butyl benzyl phthalate Carbazole Chrysene Dibenzofuran Dibenzo(a,h)anthracene Dichlorobenzene, 1,2– Dichlorobenzene, 1,4– Diethyl phthalate Di–n–butyl phthalate Fluoranthene Fluorene Indeno(1,2,3–cd)pyrene Methylnaphthalene, 2– Methylphenol, 4– Naphthalene Phenanthrene Pyrene	16 INORGANICS Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Silver Thallium Vanadium Zinc 11 VOLATILES Acetone Benzene Chlorobenzene Dichloroethane, 1,2– Dichloroethene, 1,2– (Total) Dichloropropane, 1,2– Ethylbenzene Toluene Trichloroethene Vinyl chloride Xylenes (Total) 15 SEMIVOLATILES Acenaphthene Bis(2–chloroethyl)ether Bis(2–chloroisopropyl)ether Dibenzofuran Dichlorobenzene, 1,2– Dichlorobenzene, 1,4– Diethyl phthalate Dimethylphenol, 2,4– Fluorene Methylnaphthalene, 2– Methylphenol, 2– Methylphenol, 4– Naphthalene Nitrophenol, 4– Phenol 1 PESTICIDES/PCBs Dieldrin	5 INORGANICS Aluminum Arsenic Chromium Manganese Vanadium 4 VOLATILES Carbon disulfide Dichloroethene, 1,2– (total) Tetrachloroethane, 1,1,2,2– Trichloroethene

TABLE 3-7 (cont.)
CONSTITUENTS OF POTENTIAL CONCERN
NCBC DAVISVILLE - SITE 09

SURFACE SOIL (cont.)	SUBSURFACE SOIL (cont.)	GROUND WATER (cont.)	SURFACE WATER (cont.)
16 PESTICIDES/PCBs BHC, beta- Chlordane, alpha Chlordane, gamma- DDD, 4,4'- DDE, 4,4'- DDT, 4,4'- Dieldrin Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone Heptachlor Heptachlor epoxide Methoxychlor, p,p'- Aroclor-1260	12 PESTICIDES/PCBs Aldrin BHC, alpha BHC, beta- Chlordane, alpha Chlordane, gamma- DDD, 4,4'- DDE, 4,4'- DDT, 4,4'- Dieldrin Endosulfan II Endrin Aroclor-1260		

(a) Dioxins and furans expressed as 2,3,7,8-TCDD toxic equivalents

TABLE 3-7 (cont.)
CONSTITUENTS OF POTENTIAL CONCERN
NCBC DAVISVILLE - SITE 09

37 CLAMS	36 MUSSELS	36 OYSTERS
10 INORGANICS Arsenic Cadmium Chromium Copper Lead Manganese Mercury Nickel Silver Zinc	9 INORGANICS Arsenic Cadmium Chromium Copper Lead Manganese Nickel Silver Zinc	9 INORGANICS Arsenic Cadmium Chromium Copper Lead Manganese Nickel Silver Zinc
17 SEMIVOLATILES Anthracene Benzofluoranthene Benzotriazole Benzotriazole, chlorinated Benzo(a)anthracene Benzo(a)pyrene Benzo(e)pyrene Benzo(ghi)perylene Chrysene Coronene Dibenzo(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Perylene Phenanthrene Pyrene	17 SEMIVOLATILES Anthracene Benzofluoranthene Benzotriazole Benzotriazole, chlorinated Benzo(a)anthracene Benzo(a)pyrene Benzo(e)pyrene Benzo(ghi)perylene Chrysene Coronene Dibenzo(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Perylene Phenanthrene Pyrene	17 SEMIVOLATILES Anthracene Benzofluoranthene Benzotriazole Benzotriazole, chlorinated Benzo(a)anthracene Benzo(a)pyrene Benzo(e)pyrene Benzo(ghi)perylene Chrysene Coronene Dibenzo(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Perylene Phenanthrene Pyrene
10 PESTICIDES/PCBs BHC, alpha- BHC, gamma- Chlordane, alpha- Chlordane, gamma- DDD, p,p'- DDE, p,p'- DDT, p,p'- Hexachlorobenzene Aroclor-1242 Aroclor-1254	10 PESTICIDES/PCBs BHC, alpha- BHC, gamma- Chlordane, alpha- Chlordane, gamma- DDD, p,p'- DDE, p,p'- DDT, p,p'- Hexachlorobenzene Aroclor-1242 Aroclor-1254	10 PESTICIDES/PCBs BHC, alpha- BHC, gamma- Chlordane, alpha- Chlordane, gamma- DDD, p,p'- DDE, p,p'- DDT, p,p'- Hexachlorobenzene Aroclor-1242 Aroclor-1254

TABLE 3-8
RATIONALE FOR EXCLUDING DETECTED
CONSTITUENTS FROM THE RISK ASSESSMENT
NCBC DAVISVILLE – SITE 09

16 SURFACE SOIL	22 SUBSURFACE SOIL	25 GROUND WATER	5 SURFACE WATER
7 INORGANICS Calcium (3) Cyanide (2) Iron (3) Magnesium (3) Potassium (3) Sodium (3) Thallium (2) 5 SEMIVOLATILES Diethyl phthalate (1) Dimethylphenol, 2,4– (1) Methylphenol, 4– (1) Pentachlorophenol (1) Trichlorobenzene, 1,2,4– (1) 4 PESTICIDES/PCBs BHC, alpha– (1) BHC, delta– (1) Endosulfan I (1) Aroclor–1254 (1)	8 INORGANICS Aluminum (2) Calcium (3) Cyanide (1) Iron (3) Magnesium (3) Potassium (3) Selenium (1) Sodium (3) 2 VOLATILES Methylene chloride (1) Trichloroethane, 1,1,1– (1) 5 SEMIVOLATILES Bis(2–chloroisopropyl)ether Methylphenol, 2– (1) Nitrosodiphenylamine, n– (1) Phenol (1) Trichlorobenzene, 1,2,4– (1) 7 PESTICIDES/PCBs BHC, delta– (1) Endosulfan I (1) Endrin ketone (1) Heptachlor (1) Heptachlor epoxide (1) Methoxychlor, p,p'– (1) Aroclor–1254 (1)	7 INORGANICS Calcium (3) Cyanide (1) Iron (3) Magnesium (3) Nickel (1) Potassium (3) Sodium (3) 5 VOLATILES Butanone, 2– (1) Chloroethane (1) Tetrachloroethane, 1,1,2,2– (1) Tetrachloroethene (1) Trichloroethane, 1,1,2– (1) 13 SEMIVOLATILES Anthracene (1) Carbazole (1) Chlorophenol, 2– (1) Dichlorobenzene, 1,3– (1) Dichlorophenol, 2,4– (1) Di–n–butyl phthalate (1) Fluoranthene (1) Hexachloroethane (1) Nitroso–di–n–propylamine, n– (1) Pentachlorophenol (1) Phenanthrene (1) Pyrene (1) Trichlorobenzene, 1,2,4– (1) 2 PESTICIDES/PCBs Chlordane, alpha– (1) DDD, 4,4'– (1)	5 INORGANICS Calcium (3) Iron (3) Magnesium (3) Potassium (3) Sodium (3)

(1) Detected in less than 5% of samples.
(2) Less than 5% detected at concentrations above maximum area background concentration.
(3) Essential nutrient

TABLE 3-8 (cont.)
RATIONALE FOR EXCLUDING DETECTED
CONSTITUENTS FROM THE RISK ASSESSMENT
NCBC DAVISVILLE – SITE 09

11 CLAMS	11 MUSSELS	11 OYSTERS
1 INORGANICS Iron (3) 10 SEMIVOLATILES MW=178, C1-homologs (4) MW=178, C2-homologs (4) MW=178, C3-homologs (4) MW=178, C4-homologs (4) MW=228 (4) MW=252 (4) MW=276 (4) MW=278 (4) MW=302 (4) PAHs (total parent) (4)	1 INORGANICS Iron (3) 10 SEMIVOLATILES MW=178, C1-homologs (4) MW=178, C2-homologs (4) MW=178, C3-homologs (4) MW=178, C4-homologs (4) MW=228 (4) MW=252 (4) MW=276 (4) MW=278 (4) MW=302 (4) PAHs (total parent) (4)	1 INORGANICS Iron (3) 10 SEMIVOLATILES MW=178, C1-homologs (4) MW=178, C2-homologs (4) MW=178, C3-homologs (4) MW=178, C4-homologs (4) MW=228 (4) MW=252 (4) MW=276 (4) MW=278 (4) MW=302 (4) PAHs (total parent) (4)

(1) Detected in less than 5% of samples.
(2) Less than 5% detected at concentrations above maximum area background concentration.
(3) Essential nutrient.
(4) Corresponds to a group of non-specific constituents.

TABLE 3-9
EXPOSURE POINT CONCENTRATIONS FOR CONSTITUENTS
OF POTENTIAL CONCERN IN SURFACE SOIL (0-2')
NCBC DAVISVILLE - SITE 09

	Geometric Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
INORGANICS		
Aluminum	5.7E+03	3.8E+04
Antimony	1.2E+01	6.5E+01
Arsenic	2.6E+00	3.3E+01
Barium	3.6E+01	1.2E+03
Beryllium	1.1E+00	7.5E+01
Cadmium	1.7E+00	1.7E+02
Chromium (III) (a)	1.9E+01	8.4E+02
Chromium (VI) (a)	2.6E+00	1.2E+02
Cobalt	9.4E+00	4.3E+02
Copper	9.6E+01	2.5E+04
Lead	1.1E+02	8.7E+03
Manganese	1.9E+02	2.9E+03
Mercury	2.1E-01	2.8E+00
Nickel	2.9E+01	4.2E+03
Selenium	9.4E-01	3.2E+00
Silver	7.5E-01	3.3E+01
Vanadium	1.8E+01	1.3E+02
Zinc	2.8E+02	3.4E+04
VOLATILES		
Acetone	1.7E-02	1.1E-01
Chloroform	6.9E-03	1.6E-02
Tetrachloroethene	7.6E-03	1.2E-02
Toluene	4.0E-03 *	3.0E-03
Trichloroethane, 1,1,1-	7.7E-03 *	4.0E-03
SEMIVOLATILES		
Acenaphthene	3.1E-01	1.4E+01
Acenaphthylene	3.8E-01	9.1E-01
Anthracene	4.2E-01	2.2E+01
Benzoic acid	4.7E-01	8.7E-01
Benzo(a)anthracene	7.8E-01	6.9E+01
Benzo(a)pyrene	6.9E-01	4.5E+01
Benzo(b/k)fluoranthene (b)	1.3E+00	2.2E+02
Benzo(g,h,i)perylene	4.7E-01	2.9E+01
bis(2-Ethylhexyl)phthalate	4.2E-01	2.3E+00
Butyl benzyl phthalate	3.2E-01	3.3E-01
Carbazole	5.3E-01	1.8E+01
Chrysene	7.6E-01	6.3E+01
Dibenzofuran	2.1E-01	8.4E+00
Dibenzo(a,h)anthracene	2.8E-01	6.5E+00
Di-n-butyl phthalate	3.6E-01	5.7E+00
Fluoranthene	1.2E+00	1.4E+02
Fluorene	2.5E-01	1.5E+01
Indeno(1,2,3-cd)pyrene	4.6E-01	2.4E+01
Methylnaphthalene, 2-	3.7E-01	4.3E+00
Naphthalene	3.2E-01	9.3E+00
Phenanthrene	1.0E+00	1.3E+02
Pyrene	9.9E-01	1.2E+02
TCDD, 2,3,7,8- (c)	2.1E-04	2.3E-04

TABLE 3-9 (cont.)
EXPOSURE POINT CONCENTRATIONS FOR CONSTITUENTS
OF POTENTIAL CONCERN IN SURFACE SOIL (0-2')
NCBC DAVISVILLE - SITE 09

	Geometric Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
PESTICIDES/PCBs		
BHC, beta-	6.9E-03	2.1E-02
Chlordane, alpha-	1.4E-02	2.8E-02
Chlordane, gamma-	1.3E-02	2.3E-02
DDD, 4,4'-	1.2E-02	9.5E-02
DDE, 4,4'-	1.0E-02	1.6E-02
DDT, 4,4'-	1.7E-02	6.0E-02
Dieldrin	9.0E-03	5.4E-02
Endosulfan II	7.4E-03 *	7.4E-03
Endosulfan sulfate	1.1E-02	3.3E-02
Endrin	9.3E-03	2.4E-02
Endrin aldehyde	5.3E-03	1.1E-01
Endrin ketone	1.2E-02	5.7E-02
Heptachlor	5.6E-03 *	1.4E-03
Heptachlor epoxide	6.1E-03	2.9E-02
Methoxychlor, p,p'-	5.4E-02	6.3E-01
Aroclor-1260	2.0E-01	3.0E+01

* = Mean exceeds the maximum detected concentration
(a) Concentrations for chromium reported as total chromium; ratio 7:1 (i.e. 7/8 chromium III and 1/8 chromium VI) used to estimate exposure point concentrations (EPCs) for chromium III and chromium VI (EPA Region II 1990 Personal Communication).
(b) EPCs estimated for benzo(b)fluoranthene and benzo(k)fluoranthene combined, since the data for these constituents were not reported separately for all Site 9 soil samples.
(c) Dioxins and furans expressed as 2,3,7,8-TCDD toxic equivalents

TABLE 3-10
EXPOSURE POINT CONCENTRATIONS FOR CONSTITUENTS OF POTENTIAL CONCERN IN SUBSURFACE SOIL (2-10')
NCBC DAVISVILLE - SITE 09

	Geometric Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
INORGANICS		
Antimony	1.3E+01	9.0E+01
Arsenic	3.1E+00	1.4E+01
Barium	5.5E+01	6.8E+02
Beryllium	1.1E+00	5.6E+00
Cadmium	3.5E+00	5.6E+01
Chromium III (a)	1.7E+01	1.3E+02
Chromium VI (a)	2.4E+00	1.9E+01
Cobalt	8.9E+00	2.6E+01
Copper	1.0E+02	2.8E+03
Lead	1.3E+02	2.1E+03
Manganese	1.9E+02	1.3E+03
Mercury	2.3E-01	1.7E+00
Nickel	3.0E+01	2.3E+02
Silver	1.5E+00	3.5E+01
Thallium	6.0E-01	6.9E-01
Vanadium	2.3E+01	8.2E+02
Zinc	3.3E+02	3.1E+03
VOLATILES		
Acetone	4.7E-02	5.9E+01
Benzene	1.3E-02	1.5E+00
Butanone, 2-	2.0E-02	1.8E+02
Chlorobenzene	1.6E-02	1.8E-01
Chloroform	7.7E-03 *	2.0E-03
Ethylbenzene	1.5E-02	9.1E+02
Tetrachloroethene	1.3E-02 *	2.0E-03
Toluene	1.4E-02	1.5E+04
Trichloroethene	1.0E-02	3.8E+00
Xylenes (Total)	2.4E-02	4.2E+03
SEMIVOLATILES		
Acenaphthene	4.6E-01	1.7E+01
Acenaphthylene	3.1E-01 *	5.1E-02
Anthracene	5.1E-01	2.3E+01
Benzo(a)anthracene	1.1E+00	4.1E+01
Benzo(a)pyrene	9.6E-01	2.2E+01
Benzo(b/k)fluoranthene (b)	2.1E+00	8.2E+01
Benzo(g,h,i)perylene	6.3E-01	1.5E+01
Bis(2-ethylhexyl)phthalate	1.0E+00	3.3E+01
Butyl benzyl phthalate	5.1E-01	8.3E+00
Carbazole	6.3E-01	1.0E+01
Chrysene	1.0E+00	2.1E+01
Dibenzofuran	4.6E-01	1.2E+01
Dibenzo(a,h)anthracene	5.4E-01	6.4E+00
Dichlorobenzene, 1,2-	6.3E-01	4.3E+00
Dichlorobenzene, 1,4-	5.5E-01	8.4E-01
Diethyl phthalate	3.2E-01 *	4.4E-02
Di-n-butyl phthalate	4.4E-01	1.3E+00
Fluoranthene	1.8E+00	9.4E+01
Fluorene	4.5E-01	1.8E+01
Indeno(1,2,3-cd)pyrene	5.9E-01	1.5E+01
Methylnaphthalene, 2-	7.1E-01	5.0E+00
Methylphenol, 4-	3.2E-01 *	2.8E-01
Naphthalene	5.4E-01	1.9E+01
Phenanthrene	1.4E+00	1.1E+02
Pyrene	1.4E+00	8.1E+01

TABLE 3-10 (cont.)
EXPOSURE POINT CONCENTRATIONS FOR CONSTITUENTS
OF POTENTIAL CONCERN IN SUBSURFACE SOIL (2-10')
NCBC DAVISVILLE - SITE 09

	Geometric Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
PESTICIDES/PCBs		
Aldrin	3.6E-03	3.6E-03
BHC, alpha	2.1E-03 *	9.8E-04
BHC, beta-	6.2E-03	4.2E-02
Chlordane, alpha	1.4E-02 *	1.3E-02
Chlordane, gamma-	1.1E-02 *	7.6E-03
DDD, 4,4'-	2.1E-02	3.2E-01
DDE, 4,4'-	1.6E-02	8.9E-01
DDT, 4,4'-	1.6E-02	6.6E-02
Dieldrin	5.8E-03	1.2E-02
Endosulfan II	1.2E-02	7.2E-02
Endrin	5.6E-03 *	1.7E-03
Aroclor-1260	2.4E-01	1.7E+00

* = Mean exceeds the maximum detected concentration

(a) Concentrations for chromium reported as total chromium; ratio 7:1 (i.e. 7/8 chromium III and 1/8 chromium VI) used to estimate exposure point concentrations (EPCs) for chromium III and chromium VI (EPA Region II 1990 Personal Communication).

(b) EPCs estimated for benzo(b)fluoranthene and benzo(k)fluoranthene combined, since the data for these constituents were not reported separately for all Site 9 soil samples.

TABLE 3-11
EXPOSURE POINT CONCENTRATIONS FOR CONSTITUENTS
OF POTENTIAL CONCERN IN GROUND WATER
NCBC DAVISVILLE – SITE 09

	Geometric Mean Concentration (mg/l)	Maximum Detected Concentration (mg/l)
INORGANICS		
Aluminum	3.6E-01	3.8E+01
Antimony	3.3E-02	7.1E-02
Arsenic	4.3E-03	1.5E-02
Barium	5.1E-02	7.5E-01
Beryllium	1.1E-03	2.7E-03
Cadmium	3.4E-04	5.2E-03
Chromium III (a)	7.0E-03	2.3E-02
Chromium VI (a)	1.0E-03	3.3E-03
Cobalt	1.0E-02	5.0E-02
Copper	7.5E-03	7.2E-02
Lead	3.4E-03	2.6E-02
Manganese	4.2E-01	1.9E+00
Mercury	2.1E-04	3.2E-04
Silver	4.2E-04	7.1E-04
Thallium	2.7E-03	3.9E-03
Vanadium	7.3E-03	2.3E-02
Zinc	2.7E-02	1.7E-01
VOLATILES		
Acetone	1.4E-02	3.0E+00
Benzene	7.7E-03	1.1E-02
Chlorobenzene	1.2E-02	6.2E-01
Dichloroethane, 1,2-	9.6E-03	3.2E-01
Dichloroethene, 1,2- (Total)	1.4E-02	2.8E+01
Dichloropropane, 1,2-	1.1E-02	9.4E-01
Ethylbenzene	1.3E-02	8.7E-02
Toluene	1.0E-02	2.8E-02
Trichloroethene	1.0E-02	1.2E+00
Vinyl chloride	1.4E-02	7.0E+00
Xylenes (Total)	1.4E-02	1.9E-01
SEMIVOLATILES		
Acenaphthene	1.2E-02	6.6E-02
Bis(2-chloroethyl)ether	8.2E-03	1.4E-02
Bis(2-chloroisopropyl)ether	5.6E-03 *	3.0E-03
Dibenzofuran	1.1E-02	2.4E-02
Dichlorobenzene, 1,2-	1.1E-02 *	8.0E-03
Dichlorobenzene, 1,4-	1.3E-02	4.2E-01
Diethyl phthalate	5.6E-03 *	2.0E-03
Dimethylphenol, 2,4-	1.2E-02	8.6E-01
Fluorene	1.2E-02	2.3E-02
Methylnaphthalene, 2-	1.1E-02	2.5E-02
Methylphenol, 2-	1.2E-02	3.5E-01
Methylphenol, 4-	1.3E-02	3.7E-01
Naphthalene	1.1E-02	4.7E-02
Nitrophenol, 4-	1.6E-02 *	3.0E-03
Phenol	1.1E-02	6.6E-02
PESTICIDES/PCBs		
Dieldrin	4.0E-05 *	2.4E-06

* = Mean exceeds the maximum detected concentration

(a) Concentrations for chromium reported as total chromium; ratio 7:1 (i.e. 7/8 chromium III and 1/8 chromium VI) used to estimate exposure point concentrations (EPCs) for chromium III and chromium VI (EPA Region II 1990 Personal Communication).

TABLE 3-12
EXPOSURE POINT CONCENTRATIONS FOR CONSTITUENTS OF POTENTIAL CONCERN IN SURFACE WATER
NCBC DAVISVILLE – SITE 09

Constituent	Geometric Mean Concentration (mg/l)	Maximum Detected Concentration (mg/l)
INORGANICS		
Aluminum	3.7E-01 *	3.4E-01
Arsenic	3.3E-03	4.2E-03
Chromium III (a)	7.7E-03	1.0E-02
Chromium VI (a)	1.1E-03	1.5E-03
Manganese	7.2E-02	1.4E-01
Vanadium	7.2E-03	1.2E-02
VOLATILES		
Carbon disulfide	4.0E-03 *	2.0E-03
Dichloroethene, 1,2- (total)	5.2E-03	6.0E-03
Tetrachloroethane, 1,1,2,2-	4.4E-03 *	3.0E-03
Trichloroethene	4.0E-03 *	2.0E-03

* = Mean exceeds the maximum detected concentration
(a) Concentrations for chromium reported as total chromium; ratio 7:1 7/8 chromium III and 1/8 chromium VI) used to estimate exposure point concentrations for chromium III and chromium VI (EPA Region II 1990 Personal Communication).

TABLE 3-13
EXPOSURE POINT CONCENTRATION FOR CONSTITUENTS OF POTENTIAL CONCERN IN SHELLFISH COLLECTED IN ALLEN HARBOR (CLAMS)
NCBC DAVISVILLE – SITE 09

	Geometric Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
INORGANICS		
Arsenic	4.8E-01	8.6E-01
Cadmium	7.3E-02	1.4E-01
Chromium III (a)	6.5E-02	5.6E-01
Chromium VI (a)	9.2E-03	8.1E-02
Copper	2.1E+00	6.0E+00
Lead	1.9E-01	4.3E+00
Manganese	3.5E+00	1.2E+01
Mercury	8.4E-03	8.9E-03
Nickel	9.0E-01	2.2E+00
Silver	1.4E-01	2.0E-01
Zinc	1.3E+01	2.1E+01
SEMIVOLATILES		
Anthracene	5.6E-04	1.3E-03
Benzofluoranthene	3.0E-03	1.2E-02
Benzotriazole	2.1E-02	8.1E-02
Benzotriazole, chlorinated	3.1E-03	8.4E-03
Benzo(a)anthracene	1.9E-03	7.8E-03
Benzo(a)pyrene	6.5E-04	4.4E-03
Benzo(e)pyrene	1.8E-03	7.1E-03
Benzo(ghi)perylene	4.9E-04	4.3E-03
Chrysene	3.4E-03	8.7E-03
Coronene	1.7E-04	5.2E-04
Dibenzo(a,h)anthracene	2.8E-04	1.3E-03
Fluoranthene	1.5E-02	4.1E-02
Fluorene	5.8E-04	1.4E-03
Indeno(1,2,3-cd)pyrene	4.9E-04	2.6E-03
Perylene	4.1E-04	2.3E-03
Phenanthrene	2.1E-03	7.7E-03
Pyrene	1.3E-02	2.8E-02
PESTICIDES/PCBs		
BHC, alpha-	6.1E-05	8.0E-05
BHC, gamma-	6.2E-05	1.3E-04
Chlordane, alpha-	1.8E-04	4.2E-04
Chlordane, gamma-	2.0E-04	5.4E-04
DDD, p,p'-	3.3E-04	7.0E-03
DDE, p,p'-	1.8E-04	9.5E-04
DDT, p,p'-	1.2E-04	1.1E-03
Hexachlorobenzene	7.6E-05	1.5E-04
Aroclor-1242	8.7E-04	2.3E-03
Aroclor-1254	3.7E-02	1.1E-01

* = Mean exceeds the maximum detected concentration

(a) Concentrations for chromium reported as total chromium; ratio 7:1 (i.e., 7/8 chromium III and 1/8 chromium VI) used to estimate exposure point concentrations (EPCs) for chromium III and chromium VI (EPA Region II 1990 Personal Communication).

TABLE 3-13 (cont.)
EXPOSURE POINT CONCENTRATION FOR CONSTITUENTS OF POTENTIAL CONCERN IN SHELLFISH COLLECTED IN ALLEN HARBOR (MUSSELS)
NCBC DAVISVILLE - SITE 09

	Geometric Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
INORGANICS		
Arsenic	4.0E-01	6.4E-01
Cadmium	1.2E-01	2.3E-01
Chromium III (a)	1.3E-01	4.0E-01
Chromium VI (a)	1.9E-02	5.7E-02
Copper	1.1E+00	2.2E+00
Lead	4.5E-01	6.1E-01
Manganese	4.5E+00	1.2E+01
Nickel	2.4E-01	8.3E-01
Silver	2.6E-02	2.6E-02
Zinc	1.1E+01	2.3E+01
SEMIVOLATILES		
Anthracene	1.5E-03	2.9E-03
Benzofluoranthene	5.9E-03	8.4E-03
Benzotriazole	4.5E-02	1.1E-01
Benzotriazole, chlorinated	5.2E-03	1.9E-02
Benzo(a)anthracene	2.8E-03	6.1E-03
Benzo(a)pyrene	7.6E-04	1.1E-03
Benzo(e)pyrene	5.3E-03	7.4E-03
Benzo(ghi)perylene	9.0E-04	1.8E-03
Chrysene	8.1E-03	1.2E-02
Coronene	1.5E-04	4.5E-04
Dibenzo(a,h)anthracene	2.7E-04	4.5E-04
Fluoranthene	4.9E-02	8.9E-02
Fluorene	1.4E-03	3.7E-03
Indeno(1,2,3-cd)pyrene	6.0E-04	1.1E-03
Perylene	8.1E-04	1.4E-03
Phenanthrene	3.5E-03	1.3E-02
Pyrene	3.4E-02	6.1E-02
PESTICIDES/PCBs		
BHC, alpha-	1.6E-04	3.0E-04
BHC, gamma-	1.7E-04	5.5E-04
Chlordane, alpha-	7.5E-04	1.7E-03
Chlordane, gamma-	8.3E-04	1.8E-03
DDD, p,p'-	1.7E-03	2.9E-03
DDE, p,p'-	1.0E-03	2.7E-03
DDT, p,p'-	2.2E-04	6.3E-04
Hexachlorobenzene	8.0E-05	1.5E-04
Aroclor-1242	4.7E-03	9.6E-03
Aroclor-1254	1.2E-01	2.0E-01

* = Mean exceeds the maximum detected concentration

(a) Concentrations for chromium reported as total chromium; ratio 7:1 (i.e., 7/8 chromium III and 1/8 chromium VI) used to estimate exposure point concentrations (EPCs) for chromium III and chromium VI (EPA Region II 1990 Personal Communication).

TABLE 3-13 (cont.)
EXPOSURE POINT CONCENTRATION FOR CONSTITUENTS OF POTENTIAL CONCERN IN SHELLFISH COLLECTED IN ALLEN HARBOR (OYSTERS)
NCBC DAVISVILLE – SITE 09

	Geometric Mean Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
INORGANICS		
Arsenic	3.2E-01	4.0E-01
Cadmium	5.2E-01	6.4E-01
Chromium III (a)	4.0E-02	4.7E-02
Chromium VI (a)	5.7E-03	6.7E-03
Copper	7.9E+01	1.1E+02
Lead	1.7E-01	2.5E-01
Manganese	1.1E+00	1.3E+00
Nickel	2.8E-01	4.4E-01
Silver	1.5E-01	7.1E-01
Zinc	5.0E+02	5.4E+02
SEMIVOLATILES		
Anthracene	8.4E-04	9.6E-04
Benzofluoranthene	2.7E-03	3.0E-03
Benzotriazole	1.4E-03	2.1E-03
Benzotriazole, chlorinated	6.6E-04	7.5E-04
Benzo(a)anthracene	5.8E-03	7.2E-03
Benzo(a)pyrene	1.7E-04	2.2E-04
Benzo(e)pyrene	1.8E-03	2.3E-03
Benzo(ghi)perylene	1.4E-04	2.3E-04
Chrysene	1.0E-02	1.2E-02
Coronene	4.5E-05	7.2E-05
Dibenzo(a,h)anthracene	3.3E-05	4.5E-05
Fluoranthene	4.9E-02	6.0E-02
Fluorene	1.4E-03	1.6E-03
Indeno(1,2,3-cd)pyrene	4.8E-05	8.3E-05
Perylene	1.8E-04	2.5E-04
Phenanthrene	4.6E-03	5.2E-03
Pyrene	2.4E-02	3.0E-02
PESTICIDES/PCBs		
BHC, alpha-	1.2E-04	1.3E-04
BHC, gamma-	8.3E-05	9.8E-05
Chlordane, alpha-	1.4E-03	1.6E-03
Chlordane, gamma-	1.5E-03	1.7E-03
DDD, p,p'-	5.2E-04	1.1E-03
DDE, p,p'-	3.9E-03	4.8E-03
DDT, p,p'-	4.0E-03	4.4E-03
Hexachlorobenzene	3.7E-05 *	2.8E-05
Aroclor-1242	5.7E-03	7.8E-03
Aroclor-1254	1.8E-01	1.9E-01

* = Mean exceeds the maximum detected concentration
(a) Concentrations for chromium reported as total chromium; ratio 7:1 (i.e., 7/8 chromium III and 1/8 chromium VI) used to estimate exposure point concentrations (EPCs) for chromium III and chromium VI (EPA Region II 1990 Personal Communication).

TABLE 3-14
SUMMARY OF CANCER RISKS FOR ALL SCENARIOS
NCBC DAVISVILLE - SITE 09

Pathway	CANCER RISKS					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Incidental ingestion of soil	4E-06	1E-04	1E-05	6E-04	--	--
Dermal contact with soil	2E-08	1E-07	6E-07	7E-06	--	--
Inhalation of particulates	7E-09	5E-08	--	--	--	--
Inhalation of Volatiles During Construction	4E-09	2E-07	--	--	--	--
Dermal Contact with Ground Water While Showering	--	--	2E-07	7E-05	--	--
Inhalation of Volatiles While Showering	--	--	2E-06	8E-04	--	--
Ingestion of Surface Water While Swimming	--	--	6E-08	7E-08	--	--
Dermal Contact with Surface Water While Swimming	--	--	3E-08	3E-08	--	--
Ingestion of Clams	--	--	--	--	7E-06	1E-05
Ingestion of Mussels	--	--	--	--	8E-06	1E-05
Ingestion of Oysters	--	--	--	--	8E-06	9E-06

(shaded) = Cancer risk > 1E-06

TABLE 3–15
SUMMARY OF CANCER RISK ESTIMATES FOR SELECTED SCENARIOS
USING TEFs FOR CARCINOGENIC PAHs
NCBC DAVISVILLE – SITE 09

Pathway	CANCER RISKS (a)					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Incidental ingestion of soil	2E–06	3E–05	9E–06	2E–04	––	––

(a) Determined using toxic equivalency factors (TEFs) for carcinogenic PAHs; shown only for pathways for which cancer risks above 1E–06 are estimated for these constituents.

[shaded] = Cancer risk > 1E–06

TABLE 3-16
SUMMARY OF CANCER RISK ESTIMATES FOR SCENARIO 3 (FUTURE SHELLFISHING)
USING THE ALTERNATIVE INGESTION RATES
NCBC DAVISVILLE - SITE 09

Pathway	CANCER RISKS (a)					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Ingestion of Clams	--	--	--	--	3E-06	5E-06
Ingestion of Mussels	--	--	--	--	9E-08	1E-07
Ingestion of Oysters	--	--	--	--	2E-06	2E-06

(a) Determined using alternative ingestion rates for clams (442 mg/d), mussels (13 g/day), and oysters (291 mg/d)

[shaded] = Cancer risk > 1E-06

TABLE 3-17
SUMMARY OF NON-CANCER HAZARD INDICES FOR ALL SCENARIOS
NCBC DAVISVILLE – SITE 09

Pathway	NON-CANCER HAZARD INDICES					
	Scenario 1 (Future Construction)		Scenario 2 (Future Recreation)		Scenario 3 (Future Shellfishing)	
	Geometric Mean	RME	Geometric Mean	RME	Geometric Mean	RME
Incidental ingestion of soil	3E-01	3E+00	4E-02	1E+00	--	--
Dermal contact with soil	3E-04	6E-03	4E-05	4E-03	--	--
Inhalation of particulates	3E-03	2E-02	--	--	--	--
Inhalation of Volatiles During Construction	6E-04	2E+01	--	--		
Dermal Contact with Ground Water While Showering	--	--	1E-03	1E-01	--	--
Inhalation of Volatiles While Showering	--	--	5E-03	2E+00	--	--
Ingestion of Surface Water While Swimming	--	--	1E-03	2E-03	--	--
Dermal Contact with Surface Water While Swimming	--	--	2E-04	2E-04	--	--
Ingestion of Clams	--	--	--	--	3E-02	6E-02
Ingestion of Mussels	--	--	--	--	3E-02	4E-02
Ingestion of Oysters	--	--	--	--	9E-02	1E-01

(shaded) = Hazard index > 1E+00

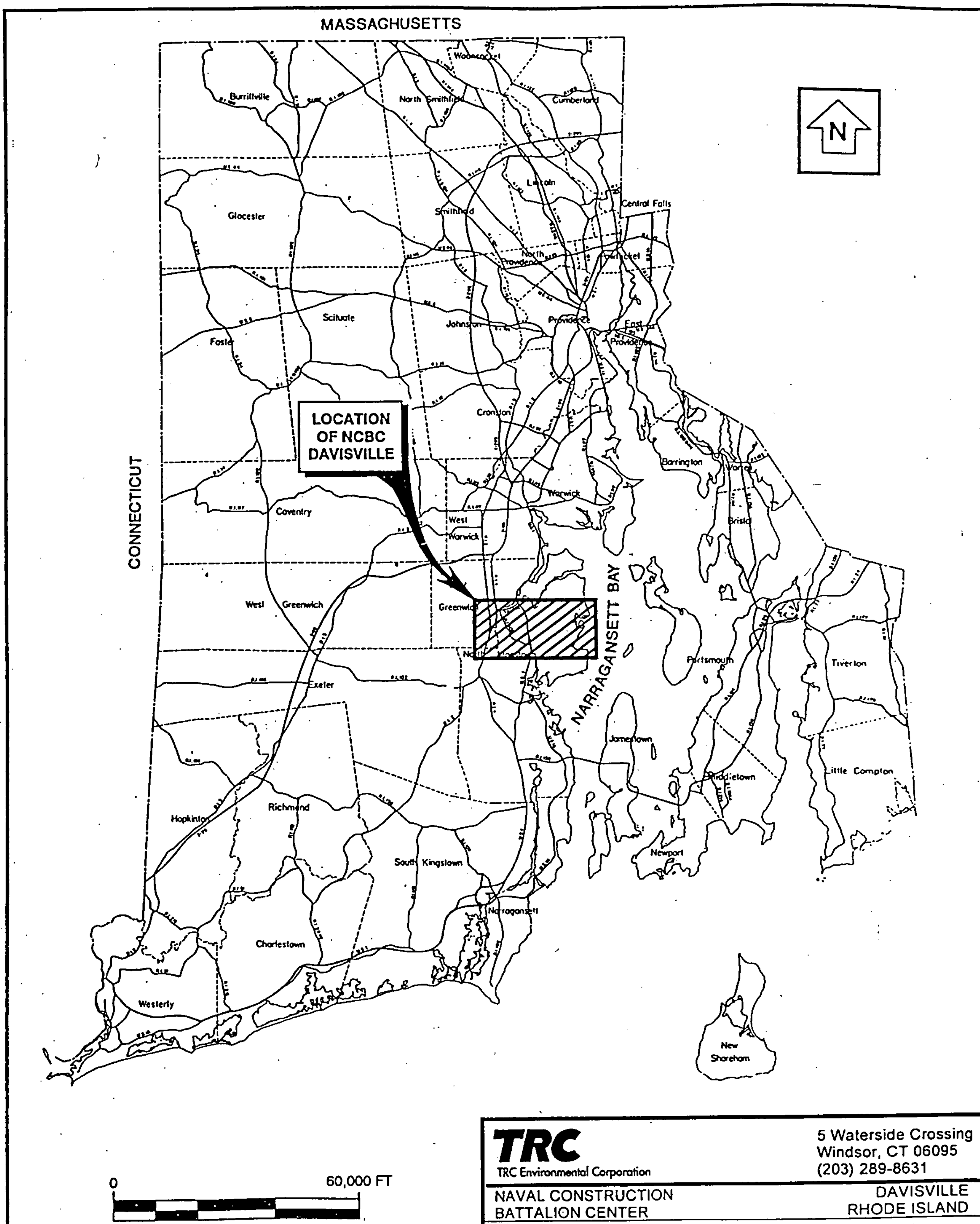
TABLE 4-1
SUMMARY OF SITE-SPECIFIC UNCERTAINTIES
NCBC DAVISVILLE - SITE 09

Uncertainty	Bias[a]
Land Use	
• Construction	↑, ↓
• Recreation	↑, ↓
• Shellfishing	↑
Pathways	
• Soil Exposures	↑
• Ground Water Exposures	↑
• Surface Water Exposures	↑, ↓
• Shellfish Ingestion	↑
Exposures	
• Magnitude	↑
• Frequency	↑
• Duration	↑
Exclusion of COCs without Toxicity Data	↓
Models	
• Fugitive Dust	↑
• Volatilization of Constituents in Air from Subsurface Soil	↑, ↓
• Volatilization of Constituents in Air from Ground Water	↑, ↓
Chemical Concentration Data	↑
Toxicity Assessment	
• RfDs/Slope Factors	↑
• Interactions between COCs (mixtures)	↑, ↓
• Use of Benzo(a)pyrene Slope Factor for Other Carcinogenic PAHs	↑
COCs with Cancer Risks Above 1E-06	
• Arsenic in Soil	↑
• Arsenic in Shellfish	↑
• Beryllium in Soil	↑
• 1,2-Dichloropropane, Trichloroethene, and Vinyl Chloride in Ground Water	↑
• Carcinogenic PAHs in Soil	↑
COCs with HIs Greater than 1E+00	
• 1,2-Dichloroethene in Ground Water	↑
• Toluene in Soil	↑

[a] ↑ : likely overestimation (upward bias) in the estimation of risk
↓ : likely underestimation (downward bias) in the estimation of risk
↑, ↓ : may under- or overestimate risk

FIGURES

LIST OF FIGURES



TRC
TRC Environmental Corporation

5 Waterside Crossing
Windsor, CT 06095
(203) 289-8631

NAVAL CONSTRUCTION BATTALION CENTER — DAVISVILLE RHODE ISLAND

FIGURE 2-1.

NCBC SITE LOCATION PLAN

Date 10/93 | Project No. 01042-0050-400

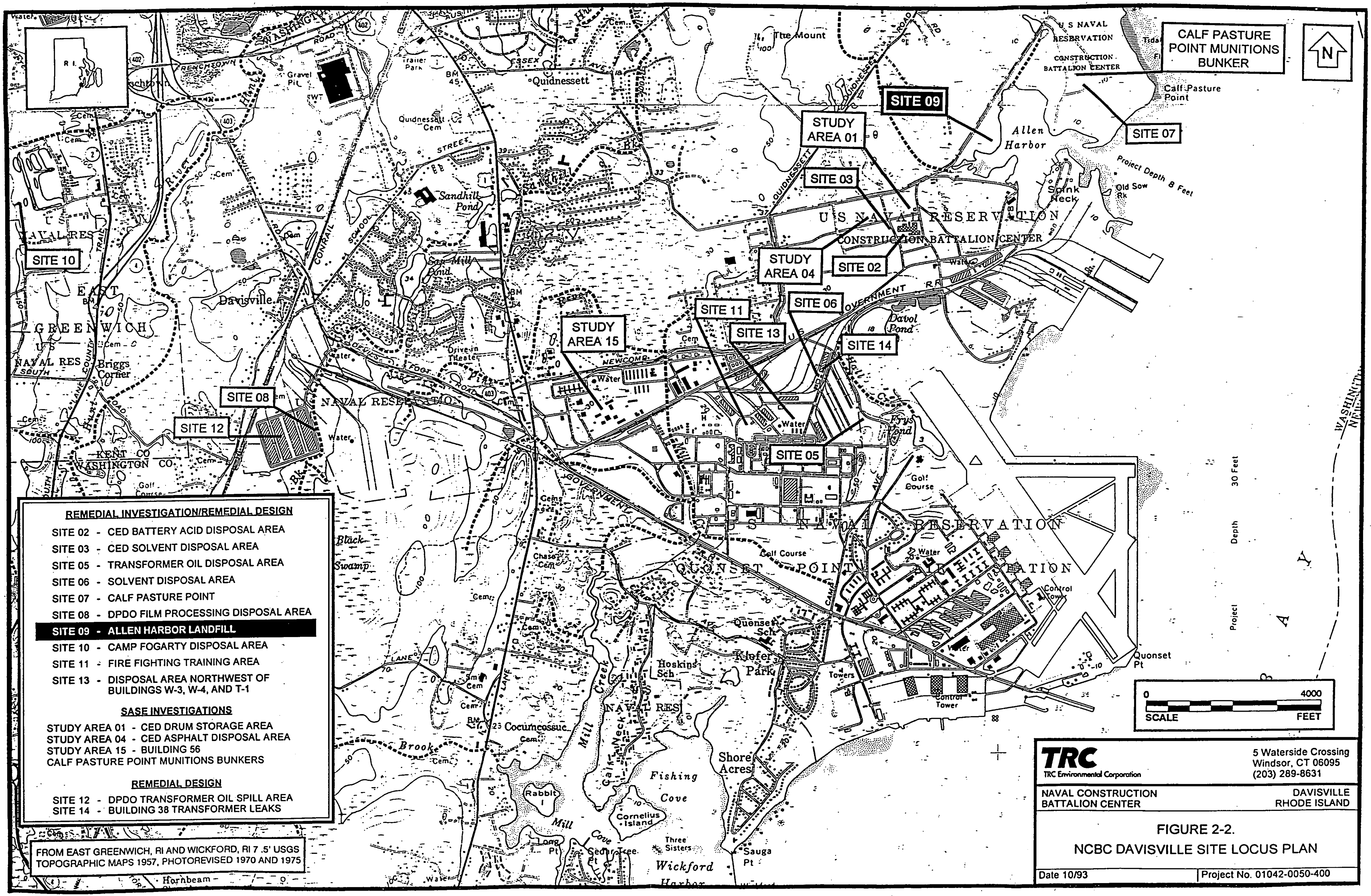


FIGURE 2-2.
NCBC DAVISVILLE SITE LOCUS PLAN

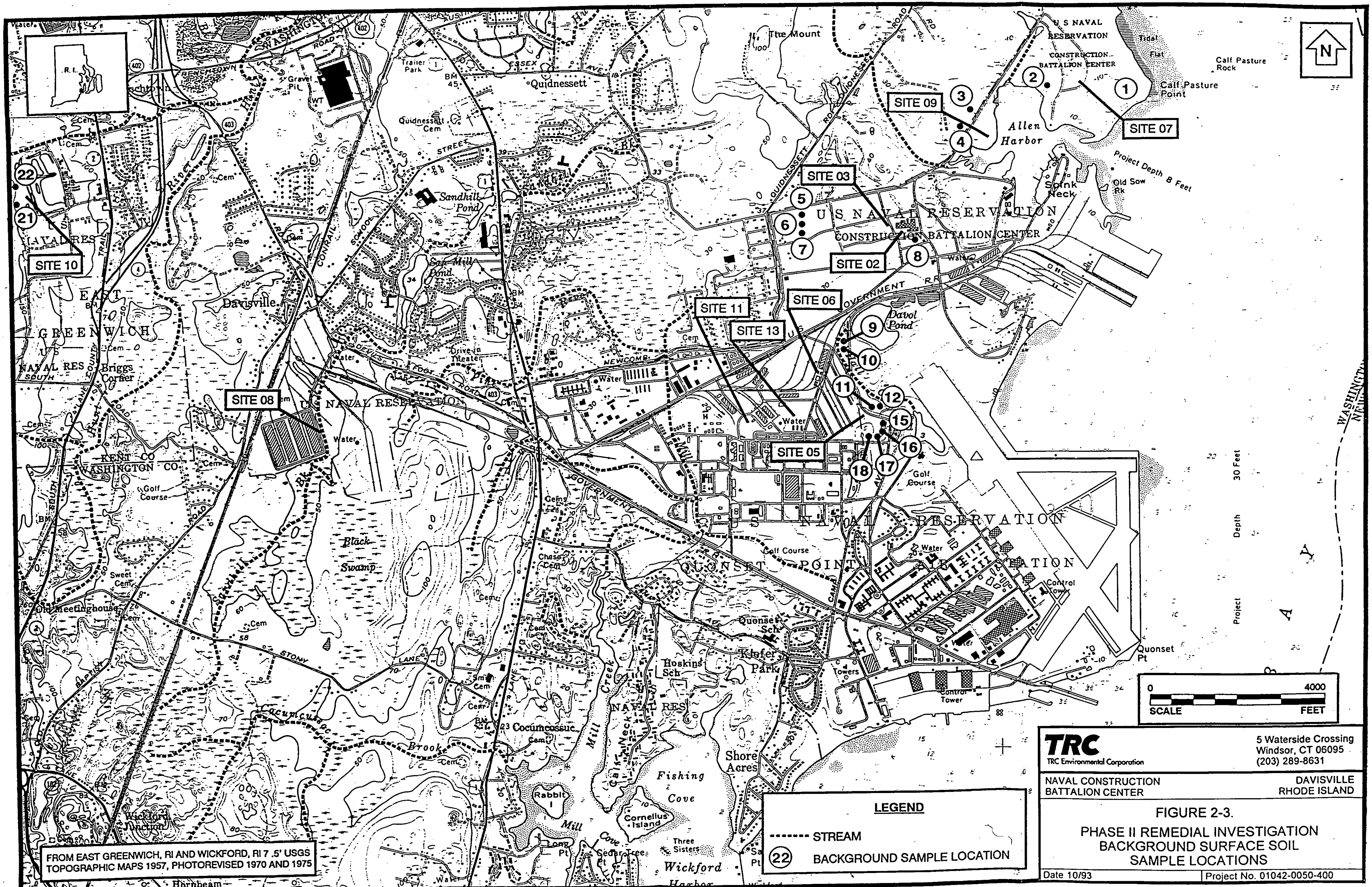
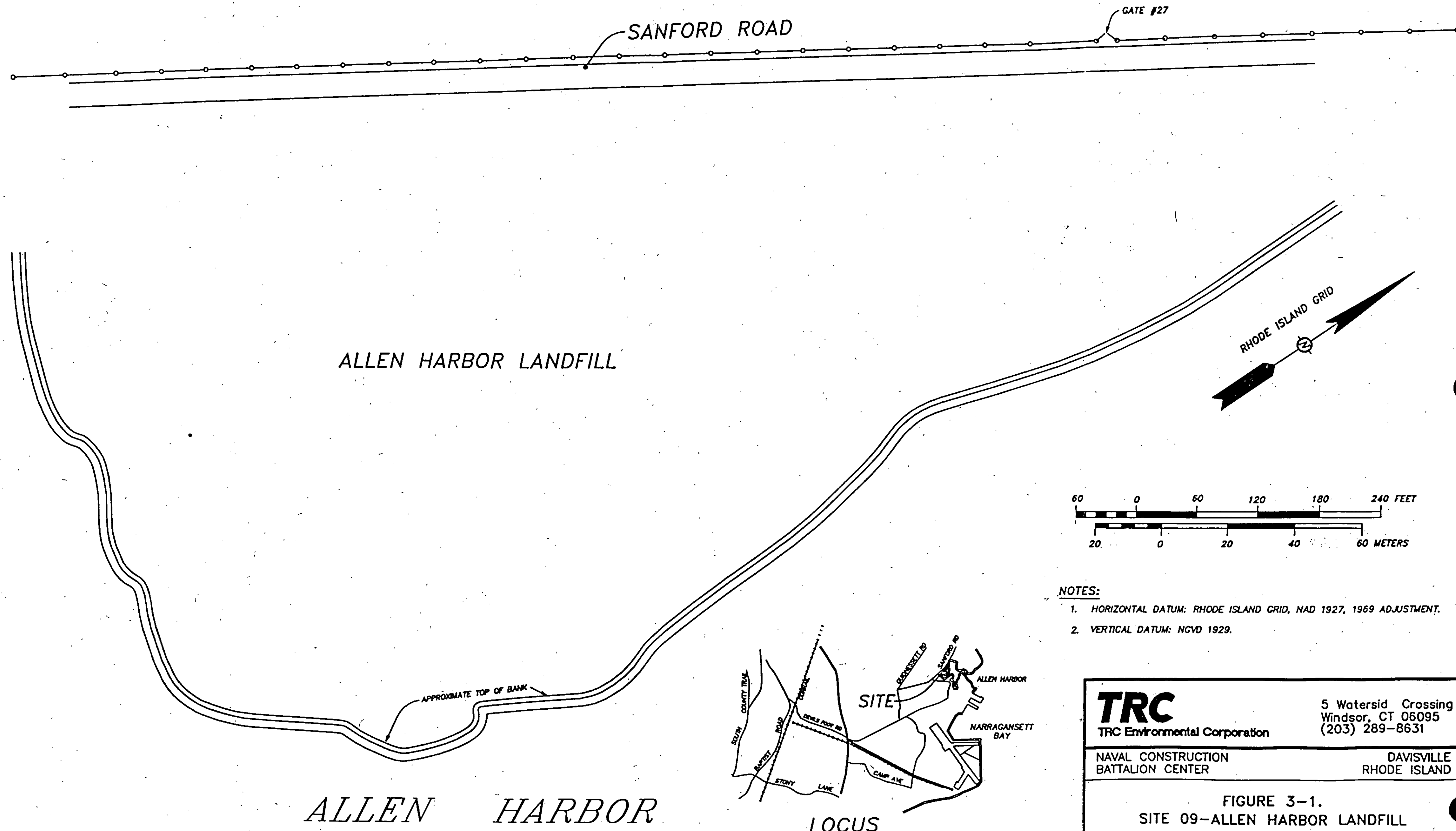


FIGURE 2-3.
PHASE II REMEDIAL INVESTIGATION
BACKGROUND SURFACE SOIL
SAMPLE LOCATIONS



NOTES:

1. HORIZONTAL DATUM: RHODE ISLAND GRID, NAD 1927, 1969 ADJUSTMENT.
2. VERTICAL DATUM: NGVD 1929.

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TRC Environmental Corporation
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(203) 289-8631

NAVAL CONSTRUCTION BATTALION CENTER — DAVISVILLE RHODE ISLAND

FIGURE 3-1.
SITE 09-ALLEN HARBOR LANDFILL
SITE PLAN

Date: 10/93 | Project No. 01042-0050-400

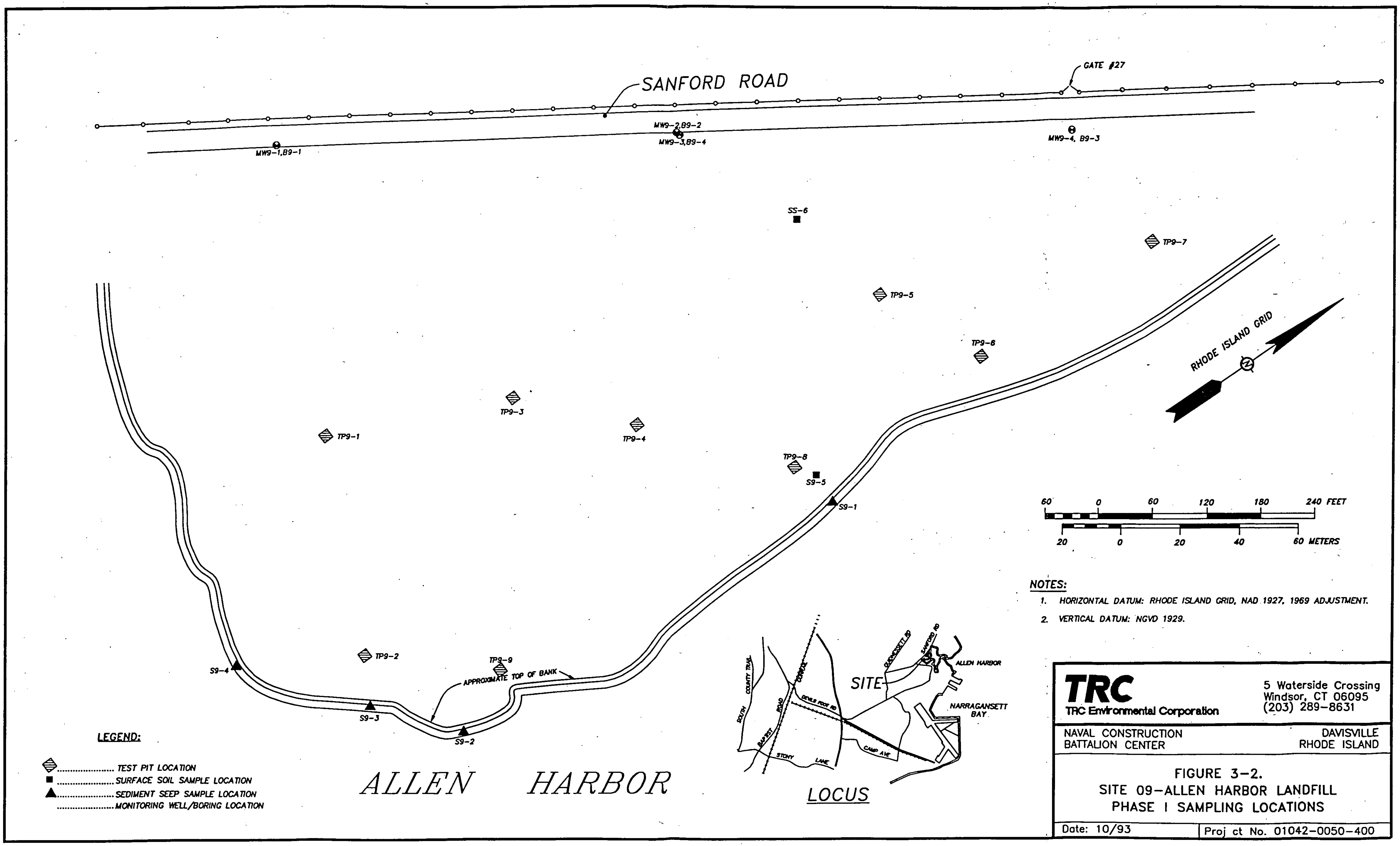
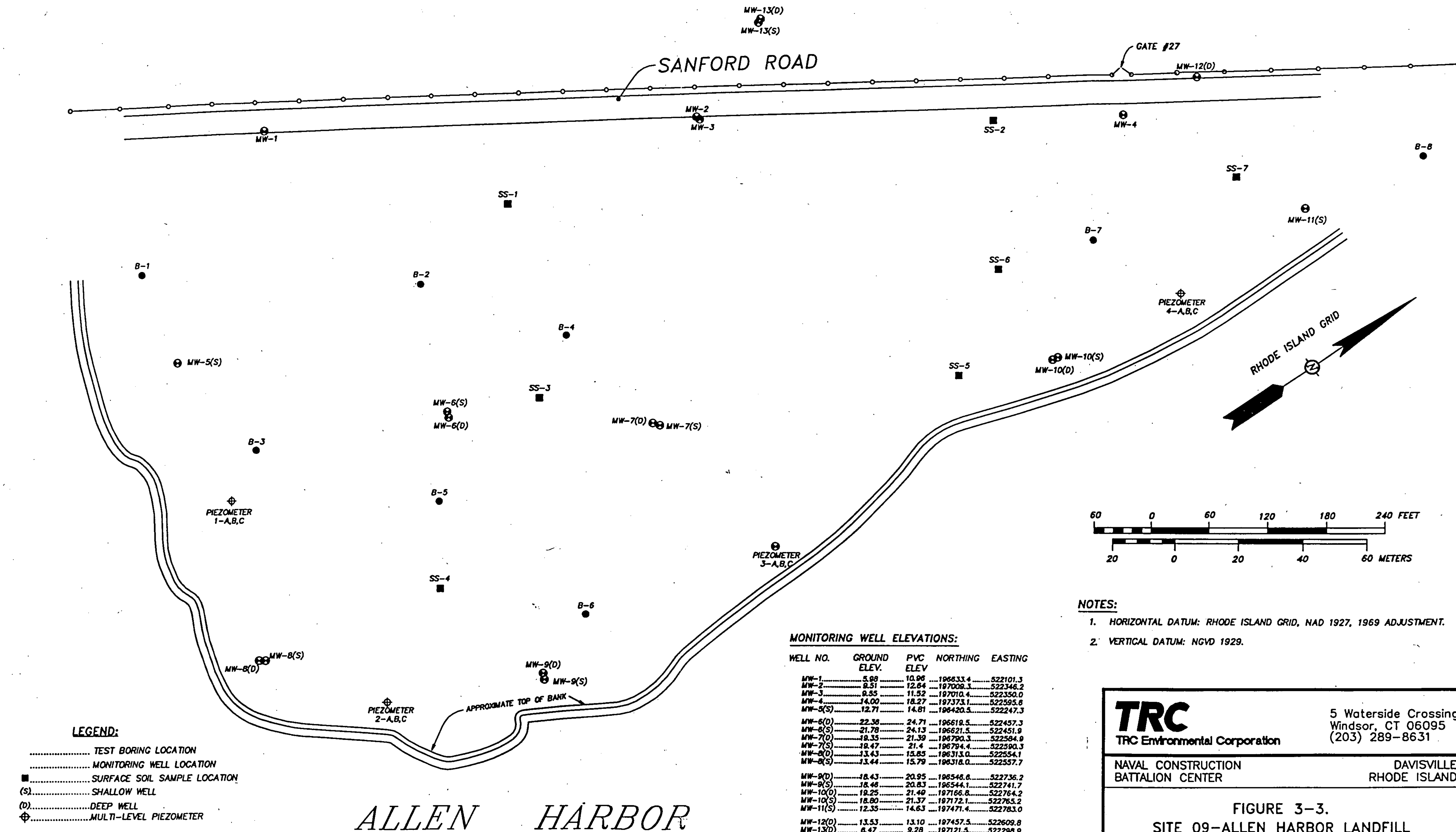


FIGURE 3-2.
SITE 09-ALLEN HARBOR LANDFILL
PHASE I SAMPLING LOCATIONS



NOTES:

1. HORIZONTAL DATUM: RHODE ISLAND GRID, NAD 1927, 1969 ADJUSTMENT.
2. VERTICAL DATUM: NGVD 1929.

MONITORING WELL ELEVATIONS:

WELL NO.	GROUND ELEV.	PVC ELEV	NORTHING	EASTING
MW-1	5.98	10.96	196633.4	522101.3
MW-2	9.51	12.64	197009.3	522346.2
MW-3	9.55	11.52	197010.4	522350.0
MW-4	14.00	18.27	197373.1	522595.8
MW-5(S)	12.71	14.81	196420.5	522247.3
MW-6(D)	22.38	24.71	196619.5	522457.3
MW-6(S)	21.78	24.13	196621.5	522451.9
MW-7(D)	19.35	21.39	196790.3	522584.9
MW-7(S)	19.47	21.4	196794.4	522590.3
MW-8(D)	13.43	15.85	196313.0	522554.1
MW-8(S)	13.44	15.79	196318.0	522557.7
MW-9(D)	18.43	20.95	196546.6	522736.2
MW-9(S)	18.46	20.83	196544.1	522741.7
MW-10(D)	19.25	21.49	197166.8	522764.2
MW-10(S)	18.80	21.37	197172.1	522765.2
MW-11(S)	12.35	14.63	197471.4	522783.0
MW-12(D)	13.53	13.10	197457.5	522609.8
MW-13(D)	6.47	9.28	197121.5	522298.9
MW-13(S)	6.31	8.64	197117.8	522300.7

LEGEND:

- .... TEST BORING LOCATION
- .... MONITORING WELL LOCATION
- ■ .... SURFACE SOIL SAMPLE LOCATION
- (S) .... SHALLOW WELL
- (D) .... DEEP WELL
- ⊕ .... MULTI-LEVEL PIEZOMETER

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Windsor, CT 06095
(203) 289-8631

NAVAL CONSTRUCTION BATTALION CENTER — DAVISVILLE RHODE ISLAND

FIGURE 3-3.
SITE 09-ALLEN HARBOR LANDFILL
PHASE II SAMPLING LOCATIONS

Date: 10/93 | Project No. 01042-0050-400

98M100

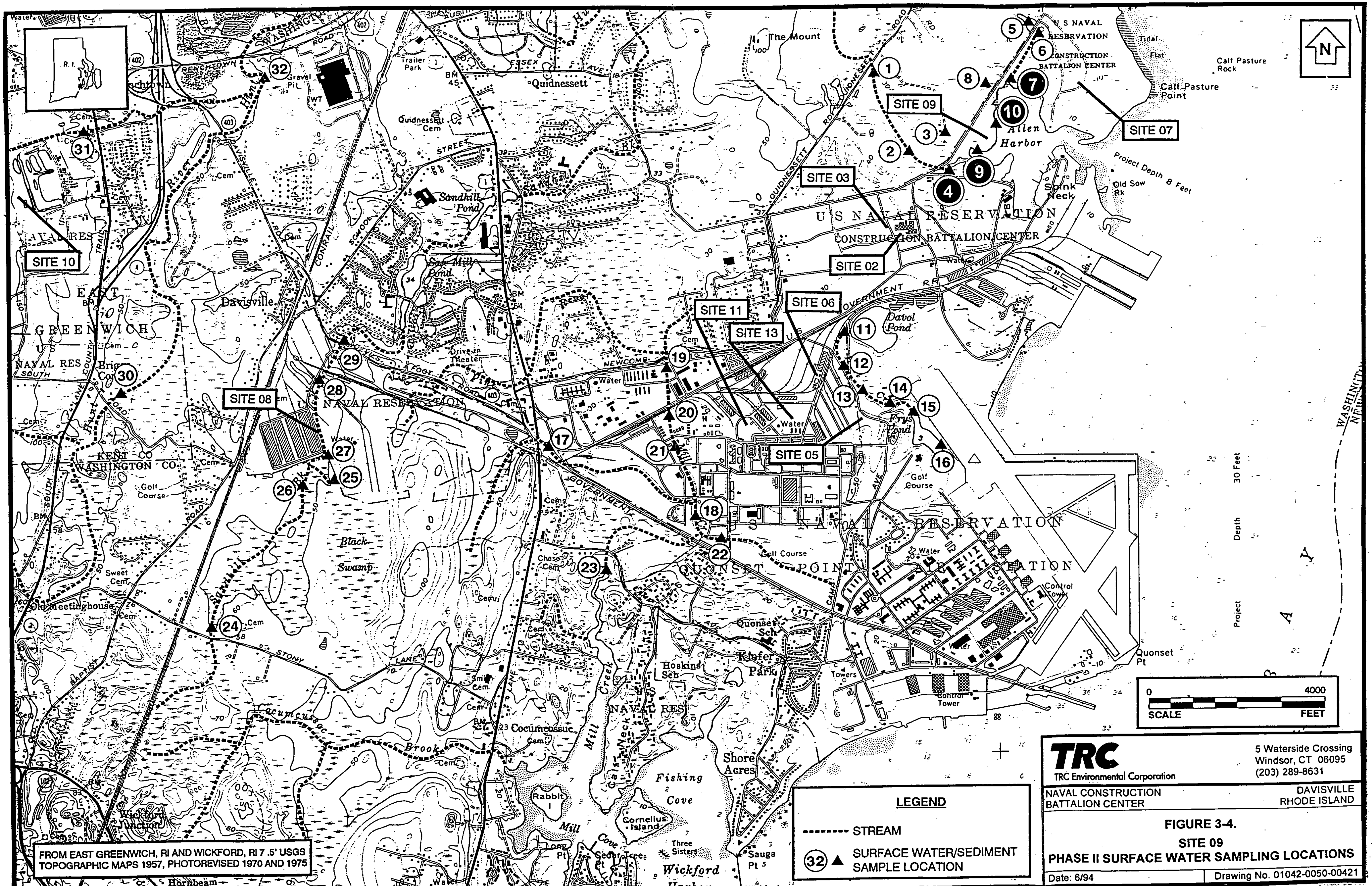

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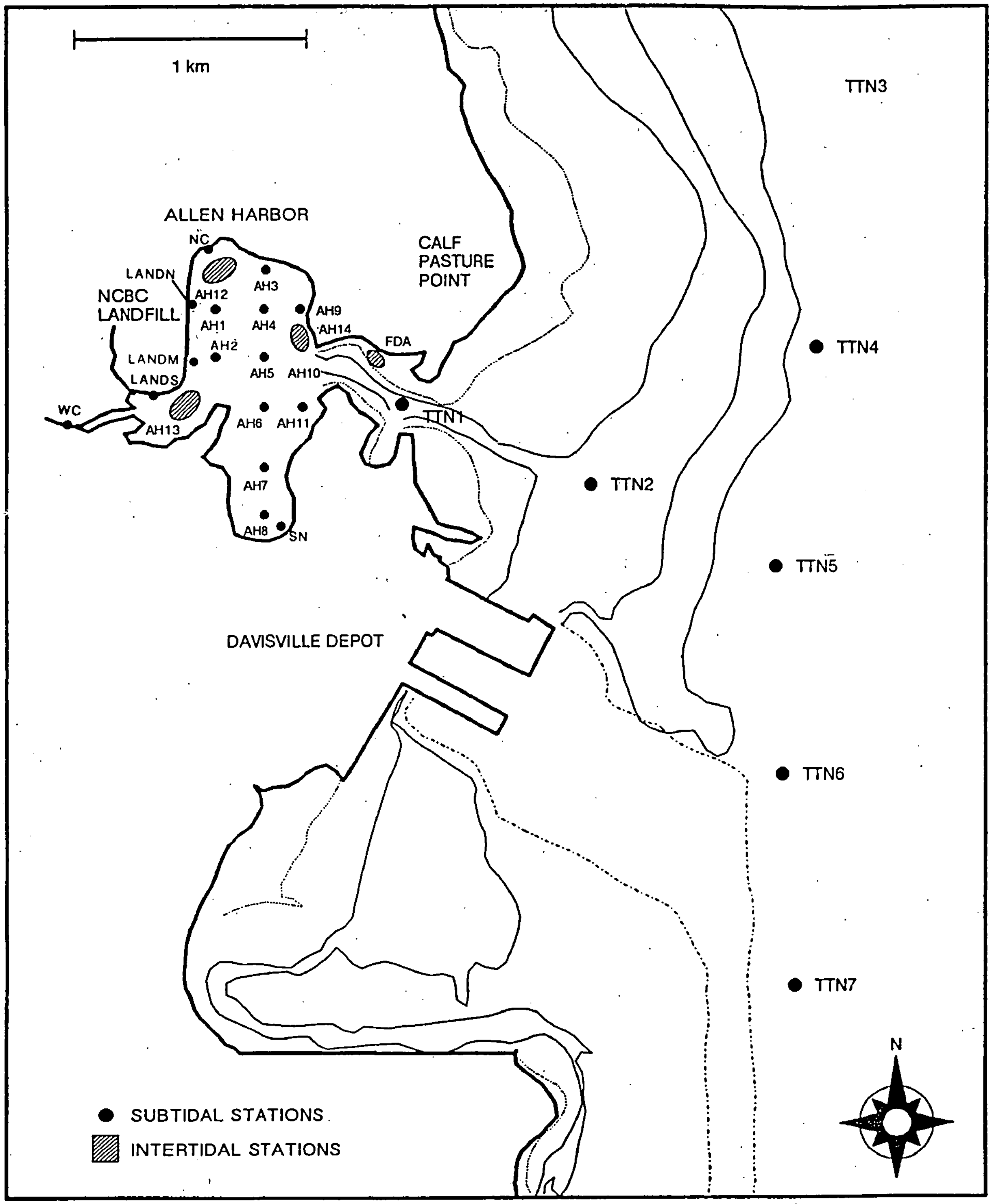
FIGURE 3-4.
SITE 09
PHASE II SURFACE WATER SAMPLING LOCATIONS

Date: 6/94 | Drawing No. 01042-0050-00421



Source: NOSC (1991) and EPA (1993c)

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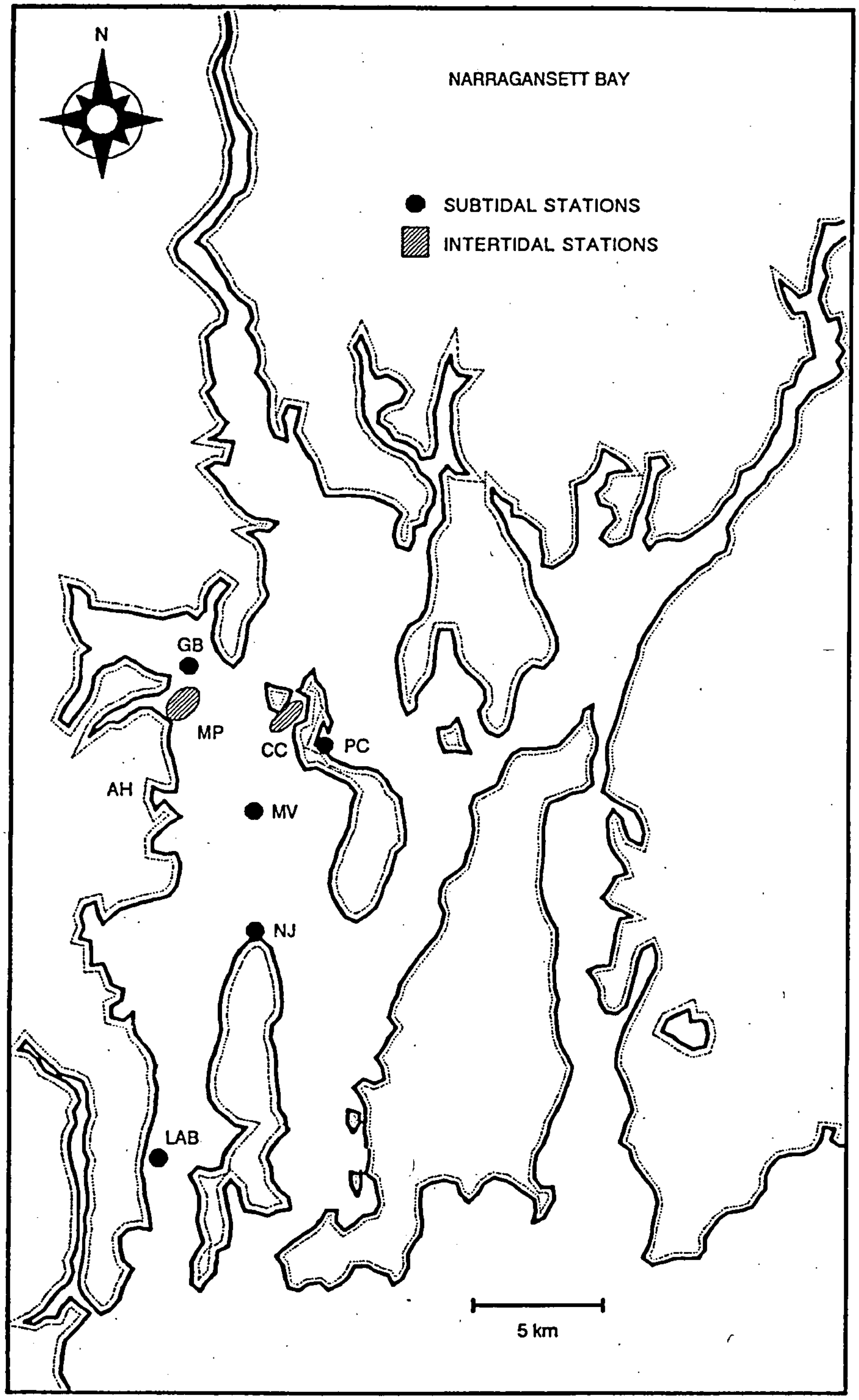
NAVAL CONSTRUCTION BATTALION CENTER — DAVISVILLE RHODE ISLAND

FIGURE 3-5.
SITE 09
SHELLFISH SAMPLING LOCATIONS IN ALLEN HARBOR

Date: 6/94 | Drawing No. 01042-0050-00421



Source: NOSC (1991)

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NAVAL CONSTRUCTION BATTALION CENTER — DAVISVILLE RHODE ISLAND

FIGURE 3-6.
SITE 09
SHELLFISH SAMPLING LOCATIONS IN NARRAGANSETT BAY

Date: 6/94 | Drawing No. 01042-0050-00421

APPENDIX A

TOXICOLOGICAL PROFILES FOR CONSTITUENTS OF POTENTIAL CONCERN

APPENDIX A

TOXICOLOGICAL PROFILES FOR CONSTITUENTS OF POTENTIAL CONCERN

A.1 Inorganics

Aluminum

Aluminum is one of the most abundant metals in the earth's crust, and it is ubiquitous in air, water and soil (Goyer, 1986). The toxicity of aluminum can be divided into three major categories: (1) the effect of aluminum compounds on the gastrointestinal tract; (2) the effect of inhalation of aluminum compounds; and (3) systemic toxicity of aluminum. Aluminum compounds can alter absorption of other elements in the gastrointestinal tract (i.e., fluoride, calcium, iron, cholesterol, phosphorus) and alter gastrointestinal tract motility by inhibition of acetylcholine-induced contractions. Inhalation of aluminum dusts can lead to the development of pulmonary fibrosis producing both restrictive and obstructive pulmonary disease. A progressive fatal neurologic syndrome has been noted in patients on long-term intermittent hemodialysis treatment for chronic renal failure and may be due to aluminum intoxication. Symptoms in these patients include a speech disorder followed by dementia, convulsions and myoclonus. Aluminum content of brain, muscle and bone tissues is increased in these patients. Sources of the excess aluminum may be from oral aluminum hydroxide commonly given to these patients or from aluminum in dialysis fluid derived from tap water used to prepare the dialysate fluid. The available data have been evaluated and found to be inadequate for quantitative non-cancer risk assessment (EPA, 1993a,b). EPA (1993a,b) has not evaluated aluminum with regard to its potential human carcinogenicity.

Antimony

The best characterized human health effect associated with the inhalation of antimony is myocardial damage. The suggested no-observed-adverse-effect-level (NOAEL) for antimony induced myocardial damage is 0.003 mg antimony/kg body weight (bw)/day (mg/kg-d). The chronic oral Reference Dose (RfD) for antimony is 4E-04 mg/kg-d (EPA, 1993a), and is based on a chronic rat bioassay. Rats were administered 5 ppm (0.35 mg/kg bw/day) potassium antimony tartrate in drinking water for two years. The critical effects associated with this study are a decrease in longevity, a decrease in fasting blood glucose levels and an alteration in cholesterol levels. An uncertainty factor of 1,000 was applied to the lowest observed adverse effect level (LOAEL) of 0.35 mg/kg bw/day to obtain the RfD. The confidence level in this RfD is low since there was only 1 dose level of antimony used and no observed adverse effect level (NOAEL) was established. The subchronic oral RfD is also 4E-04 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral slope factors have been cross-assigned to inhalation.

This compound has not been evaluated by the U.S. EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Arsenic

Symptoms of arsenic intoxication consist of fever, anorexia, hepatomegaly, melanosis, and cardiac arrythmia. Other features include upper respiratory tract symptoms, peripheral neuropathy, and gastrointestinal, cardiovascular and hematopoietic effects. Liver injury is characteristic of longer term or chronic exposure (Goyer, 1986).

The chronic oral RfD is 3E-04 mg/kg-d (EPA, 1993a). The critical effects associated with ingestion of arsenic in water and food are keratosis, hyperpigmentation and possible complications at a dose of 0.8 mg/kg-d in humans. An uncertainty factor of 3 was applied to the LOAEL of 0.8 mg/kg-d to obtain the RfD. This uncertainty factor was used to account for the lack of reproductive toxicity data and for individual sensitivity. The confidence in the RfD is medium. The subchronic oral RfD is also 3E-04 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "A" - a human carcinogen (EPA, 1993a). Exposure to arsenic by the oral route is known to produce skin cancer, while inhalation will cause lung cancer. The slope factors for these carcinogenic effects are 1.8 $(mg/kg\text{-}d)^{-1}$ (5E-05 $(\mu g/l)^{-1}$) for ingestion and 5E+01 $(mg/kg\text{-}d)^{-1}$ (4.3E-03 $(\mu g/m^3)^{-1}$) for inhalation (EPA, 1993a,b).

Barium

Symptoms of accidental poisoning from ingestion of soluble barium salts has resulted in gastroenteritis, muscular paralysis, decreased pulse rate, and ventricular fibrillation and extra-systoles (Goyer, 1986).

The chronic oral RfD for barium is 7E-02 mg/kg-d (EPA, 1993a) and is based upon drinking water studies in humans and various rodent studies. In one human study, barium (as barium chloride) was administered in the drinking water at 0 mg/L for weeks 0-2; 5 mg/L for weeks 3-6; and 10 mg/L for weeks 7-10. A NOAEL of 10 mg/L was identified in this study which corresponds to 0.21 mg/kg-d. An uncertainty factor of 3 was applied to the NOAEL to obtain this RfD. This uncertainty factor was used to account for the use of subchronic rather than chronic data. The confidence level in this RfD is medium. The subchronic oral RfD is also 7E-02 mg/kg-d (EPA, 1993b).

Occupational poisoning to barium is uncommon, but a benign pneumoconiosis (baritosis) may result from inhalation of barium sulfate dust and barium carbonate. It is not incapacitating and is usually reversible with cessation of exposure. The chronic inhalation RfD value of 1E-04 mg/kg-d (EPA, 1993b) is based on a 4 month inhalation study in rats where the critical effect was fetotoxicity. An uncertainty factor of 1,000 was applied. The subchronic inhalation RfD is 1E-03 mg/kg-d (EPA, 1993b) and was derived using an uncertainty factor of 100.

Barium has not been evaluated by the U.S. EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Beryllium

The major toxicologic effects of beryllium are on the lung. It may produce an acute chemical pneumonitis, hypersensitivity or chronic granulomatous pulmonary disease (berylliosis) (Goyer, 1986).

The chronic oral RfD for beryllium is 5E-03 mg/kg-d (EPA, 1993a). This value is based upon a chronic drinking water study in rats. Beryllium was administered to rats over their lifetime at a concentration of 0 or 5 ppm (0.54 mg/kg-d) in drinking water. There were no observed adverse effects. An uncertainty factor of 100 was applied to the NOAEL to obtain the RfD. This uncertainty factor was used to account for inter- and intraspecies variability. The confidence level for the RfD is low. The subchronic oral RfD is also 5E-03 mg/kg-d (EPA, 1993b). Since EPA (1993a,b) has not established inhalation RfDs for beryllium, the oral RfDs are cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Beryllium compounds have been shown to induce malignant lung tumors via inhalation in rats and monkeys and osteogenic sarcoma via intravenous or intramedullary injection in rabbits. The oral slope factor for beryllium is 4.3 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) and is based on tumors at multiple sites in rats exposed to beryllium in drinking water. The inhalation slope factor for beryllium is 8.4E+00 $(mg/kg\text{-}d)^{-1}$ (2.4E-03 $(\mu g/m^3)^{-1}$) (EPA, 1993a,b) and is based upon lung cancer deaths among workers exposed to beryllium via inhalation.

Cadmium

Ingestion of cadmium results in nausea, vomiting and abdominal pain. Inhalation of cadmium fumes may result in an acute chemical pneumonitis and pulmonary edema (Goyer, 1986).

The chronic oral RfDs for cadmium are 5E-04 mg/kg-d (water) and 1E-03 mg/kg-d (food) (EPA, 1993a). The critical effects associated with chronic ingestion of cadmium are proteinuria and renal damage in humans. An uncertainty factor of 10 was applied to the NOAELs (0.005 mg/kg-d for water and 0.01 mg/kg-d for food) in order to determine the RfDs. This uncertainty factor was used to account for intrahuman variability. The confidence level for the RfDs is high. In the absence of subchronic oral RfDs (EPA, 1993b), the chronic oral RfDs are used to assess subchronic exposures. Since inhalation RfDs are also unavailable (EPA, 1993a,b), the chronic oral RfD for water is used to evaluate inhalation exposures.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B1" - a probable human carcinogen (limited human and sufficient animal evidence). The inhalation of cadmium has been shown to produce respiratory tract cancers in humans and various tumors in rats and mice following inhalation and injection exposures. Based on the human data, an inhalation slope factor of 6.3 $(mg/kg\text{-}d)^{-1}$ (1.8E-03 $(\mu g/m^3)^{-1}$) has been established (EPA, 1993a,b). There are no positive cancer studies of orally ingested cadmium suitable for quantitation (EPA, 1993a).

Chromium III

Note: The concentrations for chromium on-site were reported as total chromium. In this RA, total chromium is broken down to chromium III and chromium VI based on a 7:1 ratio (i.e., 7/8 chromium III and 1/8 chromium VI).

The chronic oral RfD for chromium III is 1E+00 mg/kg-d (EPA, 1993a). This RfD is based on no observed effects in rats chronically exposed to Cr_2O_3 in their diet. An uncertainty factor of 100 and a modifying factor of 10 were applied to the NOAEL of 1400 mg/kg-d in determining the RfD. The uncertainty factor was used to account for inter- and intraspecies variability, while the modifying factor was used to reflect uncertainty in the NOAEL. The confidence in the RfD is low. The subchronic oral RfD is also 1E+00 mg/kg-d (EPA, 1993b). Since EPA (1993a,b) has not established inhalation RfDs, the oral RfDs are cross-assigned to inhalation for the purposes of this RA.

EPA (1993a,b) has not classified chromium III with regard to its potential human carcinogenicity.

Chromium VI

Note: The concentrations for chromium on-site were reported as total chromium. In this RA, total chromium is broken down to chromium III and chromium VI based on a 7:1 ratio (i.e., 7/8 chromium III and 1/8 chromium VI).

The chronic oral RfD for chromium VI is 5E-03 mg/kg-d (EPA, 1993a) and is based upon a study in which no adverse effects were observed in rats which received 0 to 11 mg/l or 25 mg/l chromium in drinking water for 1 year. No adverse effects were seen in humans drinking well water contaminated with 1 mg/l chromium VI for 3 years. An uncertainty factor of 500 was applied to the NOAEL to obtain the RfD. This uncertainty factor was used to account for variability across and within species and the less-than-lifetime exposure duration in the key study. The confidence level in the RfD is low. The subchronic oral RfD for chromium VI is 2E-02 mg/kg-d (EPA, 1993b). In the absence of a chronic inhalation RfD (EPA, 1993a,b), the oral RfD is cross-assigned to inhalation for the purposes of this RA. A subchronic inhalation RfD is not available at this time (EPA, 1993b).

The EPA weight of evidence classification for carcinogenicity of this compound by the inhalation route is "A" - a human carcinogen (sufficient evidence in humans) (EPA, 1993a). Chromium VI produces lung tumors in humans and an inhalation slope factor of 4.1E+01 $(mg/kg\text{-}d)^{-1}$ $((1.2E\text{-}02\ \mu g/m^3)^{-1})$ has been established based upon an epidemiologic study of chromate production workers. There is insufficient evidence for carcinogenicity of this compound by the oral route (EPA, 1993a,b).

Cobalt

Cobalt is essential as a component of Vitamin B12 which is required for the production of red blood cells. Cobalt is well absorbed orally, probably in the small intestine. Excessive cobalt intake is known to result in cardiomyopathy. One ppm cobalt was added to beer to enhance its foaming properties and the resultant signs and symptoms were those of congestive heart failure. Autopsy findings revealed a ten-fold increase in the cardiac levels of cobalt. Occupational exposure may result in respiratory symptoms (Goyer, 1986).

No oral or inhalation RfDs have been established by EPA (1993a,b). EPA (1993a,b) has also not evaluated cobalt as to its potential human carcinogenicity.

Copper

A subchronic and chronic oral RfD for copper is reported as 1.3 mg/l (3.7E-02 mg/kg-d), which is the current drinking water standard for copper (EPA, 1993b). This is based on a single dose of 5.3 mg copper which resulted in local gastrointestinal tract irritation in humans. The oral RfD is not cross-assigned to inhalation since it is based on gastrointestinal irritation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Cyanide

The chronic oral RfD for cyanide is 2E-02 mg/kg-d (EPA, 1993a) and is based upon a chronic study in which rats were administered food fumigated with cyanide. At doses of 4.3 or 10.8 mg/kg-d, cyanide produced no treatment related effects on growth rate, no gross signs of toxicity and no histopathological lesions. An uncertainty factor of 100 and a modifying factor of 5 were supplied to the NOAEL of 10.8 mg/kg-d to obtain the RfD. The uncertainty and modifying factors were used to account for interspecies variability, individual sensitivity, and the apparent tolerance to cyanide when administered in food rather than water or by gavage. The confidence level in the RfD is medium. The subchronic oral RfD for cyanide is also 2E-02 mg/kg-d (EPA, 1993b). Since inhalation RfDs for cyanide are not available at this time (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation for the purposes of this RA.

The EPA weight of evidence classification for the human carcinogenic potential of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Lead

The health effects of lead have been well characterized through decades of medical and scientific observation. Some of these effects include cognitive and motor defects in children, lead induced anemias, increased susceptibility to viral infections and in chronic adult lead poisoning, peripheral neuropathies. It appears that some of these effects particularly the changes in the levels of certain blood enzymes and in aspects of children's neurobehavioral development, may occur at blood lead levels so low as to be essentially without a threshold (Goyer, 1986).

Based on the available data, EPA has considered it inappropriate to develop an oral RfD for inorganic lead (EPA, 1993a,b). EPA (1993a,b) has also not established an inhalation RfD for lead.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Lead has been shown to produce renal tumors in rats and mice following dietary and subcutaneous exposure. However, due to the many uncertainties associated with quantifying the dose-response for lead carcinogenicity, EPA (1993a,b) has not established slope factors for lead.

Manganese

Exposure to manganese results in two types of toxicities. The first, the result of acute inhalation exposure, results in manganese pneumonitis. The second, and more serious of the two, results from chronic exposure to manganese either by the oral or inhalation routes. Chronic manganese poisoning results in a psychiatric disorder characterized by psychological and motor difficulties (Goyer, 1986).

EPA (1993a) has established two chronic oral RfDs for manganese: 5E-03 mg/kg-d for water ingestion and 1.4E-01 mg/kg-d for food ingestion. The chronic water RfD is based on an epidemiological study of people exposed to manganese in their drinking water. Central nervous system effects occurred at a LOAEL of 6E-02 mg/kg-d. An uncertainty factor of 1 was applied to the reported NOAEL of 5E-03 mg/kg-d to obtain the RfD. The chronic food RfD is based on three studies of dietary exposure to manganese in humans. No adverse effects were reported for dietary exposures up to 1.6E-01 mg/kg-d. An uncertainty factor of 1 was applied to the selected NOAEL of 1.4E-01 mg/kg-d in deriving the chronic food RfD. A confidence level is not reported for these RfDs. The chronic RfD for inhalation is 1.1E-04 mg/kg-d (4E-04 mg/m^3) (EPA, 1993b) and is based upon a study of occupational exposure to inorganic manganese. An uncertainty factor of 300 and a modifying factor of 3 were applied to the LOAEL of 3.4E-01 mg/m^3 to obtain the RfD. These factors were used to account for individual sensitivity, the use of a LOAEL rather than a NOAEL, and the use of less-than-chronic exposure data. The confidence level in these RfDs is medium.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Mercury

Exposure to mercury vapor may produce an acute, corrosive bronchitis and interstitial pneumonitis resulting in either death or symptoms of central nervous system effects such as tremor or increased excitability. Ingestion of mercuric salts results in corrosive ulceration, bleeding and necrosis of the gastrointestinal tract usually accompanied by shock and circulatory collapse. Renal failure occurs within 24 hours. Chronic mercury poisoning mainly affects the central nervous system. Characteristic symptoms include increased excitability, tremors, gingivitis, and increased salivation. There have been some instances of proteinuria and renal damage in persons chronically exposed to mercury vapors (Goyer, 1986). The chronic oral RfD for mercury is 3E-04 mg/kg-d (EPA, 1993b), in order to prevent the critical effect of renal damage. An uncertainty factor of 1,000 was applied in order to determine the RfD. The subchronic oral RfD for mercury is also 3E-04 mg/kg-d (EPA, 1993b).

The chronic RfD value for inhalation for mercury is 3E-04 mg/m^3 (8.6E-05 mg/kg-d) (EPA, 1993b) and is based upon several occupational studies. Neurotoxicity was the critical effect following inhalation exposure. An uncertainty factor of 30 was applied to obtain the RfD. The subchronic inhalation RfD is also 8.6E-05 mg/kg-d (EPA, 1993b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Nickel

Nickel is a common allergen which results in allergic contact dermatitis (Goyer, 1986). The chronic oral RfD for nickel (soluble salts) is 2E-02 mg/kg-d (EPA, 1993a) and is based on a chronic feeding study in rats. At the LOAEL of 50 mg/kg-d, decreased body and organ weights were observed. An uncertainty factor of 300 was applied to the reported NOAEL of 5 mg/kg-d to obtain the RfD. This uncertainty factor was used to account for variability across and within species and observed inadequacies in the available reproductive studies. The confidence level in the RfD is medium. The subchronic oral RfD is also 2E-02 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfDs for nickel (soluble salts) are cross-assigned to inhalation for the purposes of this RA.

The EPA weight of evidence classification for carcinogenicity of nickel (refinery dust) by the inhalation route is "A" - a human carcinogen. Nickel (refinery dust) produces lung and nasal tumors and an inhalation slope factor of 8.4E-01 $(mg/kg\text{-}d)^{-1}$ (2.4E-04 $(\mu g/m^3)^{-1}$) has been established (EPA, 1993a). This value is based on lung tumors among sulfide nickel matte refinery workers in several countries. There is insufficient evidence for carcinogenicity of nickel (refinery dust) by the oral route (EPA, 1993a,b).

Selenium

The availability as well as toxic potential of selenium is related to its chemical form. Selenates are readily absorbed from the gastrointestinal tract whereas elemental selenium is probably not absorbed. Acute selenium poisoning produces central nervous system effects including nervousness, drowsiness and sometimes convulsions. Eye and nasal irritation may occur from exposure to vapors. Signs of chronic selenium intoxication in humans may include discolored or decaying teeth, skin eruptions, gastrointestinal distress, lassitude and partial loss of hair and nails (Goyer, 1986). The chronic oral RfD for selenium is 5E-03 mg/kg-d (EPA, 1993a). The critical effects associated with selenium exposure are chemical selenosis, including CNS abnormalities. An uncertainty factor of 3 was applied to the NOAEL in sensitive individuals to obtain the RfD. The confidence level in this RfD is high. A subchronic RfD of 5E-03 mg/kg-d has been established (EPA, 1993b). Chronic inhalation RfDs are not available (EPA, 1993a,b), and the oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Silver

The major effect of excessive absorption of silver is local or generalized impregnation of the tissues where it remains as silver sulfide, which forms an insoluble complex in elastic fibers resulting in argyria (Goyer, 1986).

The chronic oral RfD for silver is 5E-03 mg/kg-d (EPA, 1993a) and is based upon 2 to 9 year therapeutic i.v. treatments with silver in humans. Similar to other silver studies, argyria was the critical effect. In the key study, patients received a total of 1 to 4.6 g of silver via i.v. injection over 2 to 9 years. An uncertainty factor of 3 was applied to the LOAEL of 1 g silver (0.014 mg/kg-day) to derive the RfD. This uncertainty factor was used to account individual sensitivity. The confidence level in the RfD is low. The subchronic oral RfD is also 5E-03 mg/kg-d (EPA, 1993b). In the absence of EPA-established inhalation RfDs for silver (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation.

The EPA weight of evidence classification of the human carcinogenic potential of silver is "D" - not classified as to human carcinogenicity (EPA, 1993a).

Thallium

Thallium is one of the more toxic metals and can cause neural, hepatic and renal injury. It may also cause deafness and loss of vision. In some cases, deaths in humans have been reported as a result of long-term systemic thallium intake. These cases usually are caused by the contamination of food or the use of thallium as a depilatory. The chronic oral RfD for thallium carbonate is 8E-05 mg/kg-d (EPA, 1993a) and is based on a gavage study in rats. Administration of 0.20 mg thallium/kg/day for 90 days to rats produced increased SGOT levels and serum LDH levels and alopecia. An uncertainty factor of 3,000 was used to obtain this RfD. A subchronic oral RfD of 8E-04 mg/kg-d (EPA, 1993b) was established using an uncertainty factor of 300. In the absence of inhalation RfDs, the oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" (EPA, 1993a).

Vanadium

Vanadium is an ubiquitous element. Industrial exposure to vanadium may lead to bronchitis and bronchopneumonia. Vanadium overexposure may also cause skin and eye irritation, gastrointestinal distress, nausea, vomiting, abdominal pain, cardiac palpitation, tremor, nervous depression and kidney damage (Goyer, 1986). Ingestion of vanadium compounds may produce gastrointestinal disturbances, slight abnormalities of clinical chemistry related to renal function and nervous system effects.

The chronic oral RfD for vanadium is 7E-03 mg/kg-d (EPA, 1993b) and is based on a chronic drinking water study in rats. No critical effects were observed in rats following lifetime administration of 5 ppm vanadium in drinking water (converted to 7E-01 mg/kg-d). An uncertainty factor of 100 was applied to the NOAEL to obtain the RfD. The subchronic oral RfD is also 7E-03 mg/kg-d (EPA, 1993b).

Short-term inhalation exposure to high levels of vanadium has been shown to produce toxic effects in the lung, kidney, liver, adrenals and bone marrow in experimental animals. In the absence of inhalation RfDs for vanadium (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation in this RA.

EPA (1993a,b) has not evaluated vanadium with regard to its potential carcinogenicity in humans.

Zinc

Zinc is ubiquitous in the environment so that it is present in most food stuffs, water and air. About 20 to 30 percent of ingested zinc is absorbed. Acute toxicity from the ingestion of excessive zinc is uncommon (Goyer, 1986). The chronic oral RfD for zinc is 3E-01 mg/kg-d (EPA, 1993a). This value is based on a therapeutic dosage of 59.72 mg/kg-d which resulted in a 47% decrease in erythrocyte superoxide dismutase (ESOD) concentration in adult females after 10 weeks of zinc exposure. An uncertainty factor of 3 was applied to obtain the RfD. The confidence in this RfD is medium. The subchronic oral RfD is also 3E-01 mg/kg-d (EPA, 1993b). An inhalation RfD is not available (EPA, 1993a,b), and the oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

A.2 Volatiles

Acetone

The chronic oral RfD for acetone is 1E-01 mg/kg-d (EPA, 1993a) and is based on a subchronic oral study in rats. Acetone was administered by gavage for 90 days to groups of albino rats at doses of 0, 100, 500 or 2,500 mg/kg-d. The LOAEL was 500 mg/kg-d and the critical effects were increased liver and kidney weights and nephrotoxicity. An uncertainty factor of 1,000 was applied to the NOEL of 100 mg/kg-d to obtain the RfD. The uncertainty factor was used to account for inter- and intraspecies variability and the use of subchronic data. The confidence level in this RfD is low. The subchronic oral RfD for acetone is 1E+00 (EPA, 1993b) and is based on the same gavage study.

Since inhalation RfDs for acetone are not available at this time (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Benzene

Oral and inhalation RfDs for benzene have not been established (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "A" - human carcinogen. Several studies have shown benzene to increase the incidence of nonlymphocytic leukemia in humans from occupational exposure. An oral slope factor of 2.9E-02 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) and an inhalation unit risk factor of 8.3E-06 $(ug/m^3)^{-1}$ (2.9E-02 $(mg/kg\text{-}d)^{-1}$) have been established (EPA, 1993a,b).

Butanone, 2-

The chronic oral RfD for 2-butanone is 6E-01 mg/kg-d (EPA, 1993a) and is based on a multigeneration, developmental feeding study in rats. The LOAEL was 3,122 mg/kg-d and the critical effect observed was decreased fetal birth weight. The NOAEL was 1,771 mg/kg-d. An uncertainty factor of 3,000 was applied to the NOAEL to obtain the RfD. The confidence level in this RfD is low. The subchronic oral RfD for 2-butanone is 2E-01 mg/kg-d (EPA, 1993b), and is based on the same feeding study in rats, with an applied safety factor of 1,000. The chronic inhalation RfD for 2-butanone is 2.9E-01 mg/kg-d (1E+00 mg/m^3; EPA, 1993a) and is based on a developmental, inhalation study in mice. The LOAEL was 8,906 mg/m^3 and the critical effect was decreased fetal birth weight. The NOAEL was 2,978 mg/m^3. An uncertainty factor of 1,000 and a modifying factor of 3 were applied to the NOAEL to obtain the RfD. The confidence level in this RfD is low. The subchronic inhalation RfD for 2-butanone is also 2.9E-01 mg/kg-d (EPA, 1993b) based on the study and UF cited previously.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Carbon Disulfide

The chronic oral RfD for carbon disulfide is 1E-01 mg/kg-d (EPA, 1993a). This value is based on route-to-route extrapolation of data from a rabbit inhalation study (EPA, 1993a). Rabbits were exposed to 20 ppm or 40 ppm of carbon disulfide for 34 weeks prior to breeding and during the entire length of the pregnancy period. The NOAEL for this study was 20 ppm (converted to 11 mg/kg-d). An uncertainty factor of 100 was applied to the NOEL to obtain the RfD. The confidence level in this RfD is medium. The subchronic oral RfD is also 1E-01 mg/kg-d (EPA, 1993b).

The chronic inhalation RfD for carbon disulfide is 1E-02 mg/m^3 (2.9E-03 mg/kg-d) and is based upon an inhalation study in rats (EPA, 1993b). Rats were exposed to carbon disulfide at different concentrations for 8 hours/day during gestation. The NOAEL was 10 mg/m^3 and the critical effect was fetal toxicity. An uncertainty factor of 1,000 was applied to the NOAEL to obtain the RfD. The subchronic inhalation RfD is also 1E-02 mg/m^3 (2.9E-03 mg/kg-d) (EPA, 1993b).

Carbon disulfide has not been evaluated by the EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Chlorobenzene

The chronic oral RfD for chlorobenzene is 2E-02 mg/kg-d (EPA, 1993a) and is based on a 13 week dog study. Beagle dogs received chlorobenzene orally by capsule at doses of 27.25, 54.5, or 272.5 mg/kg-d for 5 days/week for 13 weeks. The LOAEL was 54.5 mg/kg-d and the critical effects observed were histopathological changes in the liver as well as changes in the blood chemistry. An uncertainty factor of 1,000 was applied to the NOAEL of 19 mg/kg-d (adjusted from 27.25 mg/kg-d to take into account X exposure) to obtain the RfD. The confidence level in this RfD is medium. The subchronic oral RfD has not been established (EPA, 1993b), and for the purpose of this RA the chronic oral RfD will be used.

The chronic inhalation RfD for chlorobenzene is 5E-03 mg/kg-d (EPA, 1993b) and is based upon a chronic study in rats. Rats were exposed to chlorobenzene at doses of 75 ppm for 7 hours/day, 5 days/week for 120 days. An uncertainty factor of 10,000 was applied to obtain the RfD. The critical effects observed were liver and kidney effects. The subchronic inhalation RfD is not available (EPA, 1993b), and for the purpose of this RA the chronic value will be used.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Chloroform

The chronic oral RfD for chloroform is 1E-02 mg/kg-d (EPA, 1993a) and is based upon a chronic dog study. Beagle dogs received chloroform orally in a toothpaste base by capsule at a dose of 15 or 30 mg/kg-d for 6 days/week for 7.5 years. The LOAEL was 15 mg/kg-d (converted to 12.9 mg/kg-d) and the critical effects observed were fatty cyst formation in the liver and an increase in serum SGPT and SGOT levels. An uncertainty factor of 1,000 was applied to the LOAEL to obtain the RfD. This uncertainty factor was used to account for interspecies variability, individual sensitivity, and the use of a LOAEL rather than a NOAEL. The confidence level in the RfD is medium. The subchronic oral RfD for chloroform is also 1E-02 mg/kg-d (EPA, 1993b). Although inhalation RfDs are unavailable (EPA, 1993a,b), the oral RfD will be cross-assigned to inhalation in this RA.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Chloroform has been shown to produce kidney and/or hepatocellular tumors in rats, mice and beagle dogs. EPA's (1993a) oral slope factor for chloroform is 6.1E-03 $(mg/kg\text{-}d)^{-1}$. The inhalation unit risk factor is 2.3E-05 $(\mu g/m^3)^{-1}$ (8.1E-02 $(mg/kg\text{-}d)^{-1}$) (EPA, 1993a,b).

Dichloroethane, 1,2-

No RfD was found in IRIS or HEAST (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). 1,2-Dichloroethane has been shown to produce several tumor types in rats and mice treated by gavage and lung papillomas in mice after topical application. An oral slope factor of 9.1E-02 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) and an inhalation unit risk factor of 2.6E-05 $(\mu g/m^3)^{-1}$ (9.1E-02) have been established (EPA, 1993a,b).

Dichloroethene, 1,2-

The chronic oral RfD for 1,2-dichloroethene (mixed isomers) is 9E-03 mg/kg-d and is based on a two year drinking water study in rats (EPA, 1993b). The LOAEL was 50 ppm and the critical effect observed was liver lesions. An uncertainty factor of 1,000 was applied to obtain the RfD. The subchronic oral RfD is also 9E-03 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound was not found (EPA, 1993a,b).

Dichloropropane, 1,2-

Oral RfDs are not available for this chemical. A chronic inhalation RfD of 1.1E-03 mg/kg-d have been established based on a unit risk factor of 4E-03 mg/m^3 (EPA, 1993a) in a rat study. The critical effect was nasal mucosa hyperplasia and an uncertainty factor of 300 was applied. The confidence level in this RfD is medium. The subchronic inhalation RfD is 3.7E-03 mg/kg-d and is based on a unit risk factor of 1.3E-02 mg/m^3 (EPA, 1993b). The critical effect is nasal mucosa hyperplasia and the uncertainty factor was 100.

The oral slope factor of 1,2-dichloropropane is 6.8E-02 (mg/kg-d)$^{-1}$ on the basis of a mouse gavage study (EPA, 1993b). Liver tumors had been induced following 1,2-dichloropropane administration. An inhalation slope factor is not available at this time (EPA, 1993a,b) and the oral slope factor has been cross-assigned to inhalation. The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - probable human carcinogen (1993b).

Ethylbenzene

The chronic oral RfD for ethylbenzene is 1E-01 mg/kg-d (EPA, 1993a) and is based on a oral subchronic rat bioassay. Rats received oral doses of 13.6, 136, 408, or 680 mg/kg-d in olive oil for 26 weeks. The LOAEL was 408 mg/kg-d and the critical effects observed were liver and kidney toxicity. An uncertainty factor of 1,000 was applied to the NOAEL of 97.1 mg/kg-d (adjusted from 136 mg/kg-d to take into account 5/7 day exposure) to obtain the RfD.

The confidence level in this RfD is low. There were no adverse effects seen in human volunteers exposed to 100 ppm (435 mg/cu.m) for eight hours. A subchronic oral RfD is not available (EPA, 1993b), and the chronic value is used in this RA.

The chronic inhalation RfD has been established and verified as 2.9E-01 mg/kg-d (1E+00 mg/m^3) (EPA, 1993a) and is based upon inhalation studies in rats and rabbits. Rats were exposed to ethylbenzene on gestation days 1-19 and rabbits were exposed on gestation days 1-24. Exposures were for 6-7 hours/day. The NOAEL was 434 mg/m^3 and the critical effect observed was developmental toxicity. An uncertainty factor of 300 was applied to the NOAEL. The confidence level in this RfD is low. A subchronic inhalation RfD is not available (EPA, 1993b), and the chronic inhalation RfD has been used in this RA.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Methylene Chloride

The chronic oral RfD for methylene chloride is 6E-02 mg/kg-d (EPA, 1993a) and is based on a drinking water bioassay in rats. Rats were given methylene chloride at doses of 5, 50, 125 or 250 mg/kg-d in drinking water for 2 years. The LOAEL was 52.58 and 58.32 mg/kg-d for males and females, respectively and the critical effect was liver toxicity. The NOAELs were 5.85 and 6.47 mg/kg-d for males and females, respectively and an uncertainty factor of 100 was applied to these NOAELs to obtain the RfD. This uncertainty factor was used to account for inter- and intraspecies variability. The confidence level in the RfD is medium. The subchronic oral RfD is also 6E-02 mg/kg-d (EPA, 1993b).

The chronic inhalation RfD for methylene chloride is 8.6E-01 mg/kg-d (3E+00 mg/m^3) (EPA, 1993b). This value is based upon a chronic inhalation study in rats. Rats were exposed intermittently to methylene chloride in air for 2 years. The NOAEL was 694.8 mg/m^3 and an uncertainty factor of 100 was applied to obtain the RfD. The subchronic inhalation RfD is also 8.6E-01 mg/kg-d (EPA, 1993b).

The EPA weight of evidence classification for human carcinogenicity is "B2" - probable human carcinogen (sufficient evidence in animals, inadequate or lack of evidence in humans) (EPA, 1993a). Methylene chloride has been shown to induce increased incidence of hepatocellular neoplasms and alveolar/bronchiolar neoplasms in male and female mice, and increased incidence of benign mammary tumors in both sexes of rats, salivary gland sarcomas in male rats and leukemia in female rats. An oral slope factor of 7.5E-03 (mg/kg-d)$^{-1}$ (EPA, 1993a) calculated as the arithmetic mean of slope factors derived from an inhalation mouse study and an oral/drinking water study in mice has been established. An inhalation slope factor of 1.6E-03 (mg/kg-d)$^{-1}$ (4.7E-07 (μg/m^3)$^{-1}$) (EPA, 1993a) has been established based upon the induction of adenomas and carcinomas (liver and lung) in mice following inhalation exposure.

Tetrachloroethane, 1,1,2,2-

Chronic oral and inhalation RfDs for this chemical are not available at this time (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "C" - possible human carcinogen (inadequate human data, limited animal evidence). 1,1,2,2-Tetrachloroethane has been shown to produce hepatocellular carcinomas in mice treated by gavage. An oral slope factor of 2E-01 $(mg/kg\text{-}d)^{-1}$ and an inhalation unit risk factor of 5.8E-05 $(\mu g/m^3)^{-1}$ (2E-01 $(mg/kg\text{-}d)^{-1}$) have been established (EPA, 1993a,b).

Tetrachloroethene

The chronic oral RfD for tetrachloroethene is 1E-02 mg/kg-d (EPA, 1993a) and is based upon a gavage study in mice. Swiss-Cox mice were exposed to tetrachloroethene by gavage at doses of 0, 20, 100, 200, 500, 1500, and 2000 mg/kg-d, 5 days/week for 6 weeks. The LOAEL was 100 mg/kg-d (converted to 71 mg/kg-d) and the critical effects observed were increased liver triglycerides and increased liver weight/body weight ratios. An uncertainty factor of 1,000 was applied to the NOAEL of 20 mg/kg-d (converted to 14 mg/kg-d) to obtain the oral RfD. The confidence level in this RfD is medium. A subchronic oral RfD of 1E-01 mg/kg-d has been established (EPA, 1993b). A chronic inhalation RfD for tetrachloroethene is not available at this time (EPA, 1993a,b), and the oral RfDs have been cross-assigned to inhalation.

The oral slope factor is 5.2E-02 $(mg/kg\text{-}d)^{-1}$ (USEPA, 1992d) on the basis of a mouse gavage study. Liver tumors were induced following tetrachloroethene administration. The inhalation slope factor has been established at 2E-03 $(mg/kg\text{-}d)^{-1}$ (USEPA, 1992d) and is based upon an inhalation study in rats and mice. Leukemia and liver lesions were observed following tetrachloroethene exposure. The EPA weight of evidence classification for the carcinogenicity of this compound is "B2/C" - probable human carcinogen.

Toluene

The chronic oral RfD for toluene is 2E-01 mg/kg-d (EPA, 1993a) and is based on a subchronic oral gavage study in rats. F344 rats received oral doses of 0, 312, 625, 1250, 2500, or 5000 mg/kg-d for 5 days/week for 13 weeks. The LOAEL was 625 mg/kg-d and the critical effects observed were changes in liver and kidney weights. An uncertainty factor of 1,000 was applied to the NOAEL of 223 mg/kg-d (adjusted from 312 mg/kg-d to take into account 5/7 day exposure) to obtain the RfD. The confidence level in this RfD is medium. There were no adverse effects seen in human volunteers exposed to 100 ppm for twenty minutes. When exposed to 200 ppm for twenty minutes they exhibited incoordination, exhilaration, and prolonged reaction times. The subchronic oral RfD is 2E+00 mg/kg-d (EPA, 1993b).

The chronic inhalation RfD for toluene is 1.1E-01 mg/kg-d (4E-01 mg/m^3) (EPA, 1993a) and is based upon human exposure data. This value is based on the occupational exposure of 30 female workers. Exposed workers breathed toluene air levels of 88 ppm (332 mg/m^3) as a TWA and control workers 13 ppm (49 mg/m^3) (TWA). A battery of eight neurobehavioral tests were administered to the exposed and control workers. All tests demonstrated that exposed workers performed poorly compared with the control cohort, with statistical significance seen in 6 of the 8 tests. An uncertainty factor of 300 was applied to the LOAEL of 119 mg/m^3 to obtain this RfD. The confidence level in this RfD is medium. A subchronic inhalation RfD is not available at this time (EPA, 1993b), and for the purpose of this RA the chronic value will be used.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

<u>Trichloroethane, 1,1,1-</u>

Oral and inhalation RfDs are not available for this chemical (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Trichloroethene

Oral and inhalation RfDs have not been established for this chemical (EPA, 1993a,b).

The oral slope factor value of 1.1E-02 $(mg/kg\text{-}d)^{-1}$, based upon a mouse gavage study has been established (USEPA, 1992d). The inhalation slope factor of 6E-03 $(mg/kg\text{-}d)^{-1}$ (USEPA, 1992d) has been established. It is based upon two inhalation studies in mice. Lung tumors were induced. The EPA weight of evidence classification for the carcinogenicity of this compound is "B2/C" - probable human carcinogen.

Vinyl Chloride

RfDs were not found in IRIS or HEAST (EPA, 1993a,b).

The oral slope factor has been established as 1.9E+00 mg/kg-d (EPA, 1993b). This value is based upon the induction of lung and liver tumors in rats in a dietary study. The inhalation slope factor has been established as 8.4E-05 $(\mu g/m^3)^{-1}$ (3E-01 $(mg/kg\text{-}d)^{-1}$) (EPA, 1993b). This value is based upon the induction of liver tumors in a 1 year inhalation study in rats. The EPA weight of evidence classification for the carcinogenicity of this compound in "A" - human carcinogen (1993b).

Xylenes

The chronic oral RfD for toluene is 2E+00 mg/kg-d (EPA, 1993a) and is based on a chronic oral gavage study in rats and mice. Rats and mice were given oral gavage doses of 0, 250 or 500 mg/kg-d (rats) and 0, 500 or 1,000 mg/kg-d (mice) for 5 days/week for 105 weeks. There was a dose-related increase in the mortality levels seen in male rats, as well as hyperactivity and decreased body weights. An uncertainty factor of 100 was applied to the NOAEL of 179 mg/kg-d (adjusted from 250 mg/kg-d to take into account 5/7 day exposure) to obtain the RfD. The confidence level in this RfD is medium. A subchronic oral RfD is not available for xylene (EPA, 1992b), and the chronic oral RfD will be used. An inhalation RfD for xylene is not available (EPA, 1993a,b) and the oral RfD has been cross-assigned to inhalation. A subchronic inhalation RfD is not available at this time (EPA, 1993b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

A.3 Semi-Volatiles

Acenaphthene

The chronic oral RfD for acenaphthene is 6E-02 mg/kg-d (EPA, 1993a) and is based on a subchronic gavage study in mice. Mice received 0, 175, 350, or 700 mg/kg-d acenaphthene by oral gavage for 90 days. The LOAEL was 350 mg/kg-d and the critical effects observed were liver weight changes accompanied by microscopic alterations. No treatment related effects on survival, clinical signs or body weight changes were observed. An uncertainty factor of 3000 was applied to the NOAEL of 175 mg/kg-d to obtain the RfD. This uncertainty factor was used to account for inter- and intraspecies variability, the use of subchronic data, and the lack of additional adequate data. The confidence level in the RfD is low. The subchronic oral RfD for acenaphthene is 6E-01 mg/kg-d (EPA, 1993b).

In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation since the effects observed via oral exposure were systemic.

This compound has not yet been evaluated by the EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Acenaphthylene

Oral and inhalation RfDs are not available for this chemical (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Anthracene

The chronic oral RfD for anthracene is 3E-01 mg/kg-d (EPA, 1993a), and is based on a subchronic gavage study in mice. Mice received 0, 250, 500, or 1,000 mg/kg-d anthracene by oral gavage for 90 days. No treatment related effects on survival, clinical signs or body weight changes were observed. An uncertainty factor of 3000 was applied to the NOAEL of 1,000 mg/kg-d to obtain the RfD. The confidence level in this RfD is low. A subchronic oral RfD of 3E+00 mg/kg-d has been established (EPA, 1993b). In the absence of an inhalation RfD, the oral RfD has been cross-assigned.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Benzoic Acid

The chronic oral RfD for benzoic acid is 4E+00 mg/kg-d (EPA, 1993a) and is based on FDA data regarding the amounts of benzoic acid and sodium benzoate produced as a food preservative. The FDA estimated a daily per capita intake of 0.9-34 mg for benzoic acid and 34-328 mg for sodium benzoate. At these levels, there are no reports of toxic effects in humans. These compounds have Generally Recognized as Safe (GRAS) status by FDA. Therefore, the upper ranges can be considered NOAELs for benzoic acid and sodium benzoate. No uncertainty factors are applied and based on conversion factors, the chronic oral RfD for benzoic acid has been established at 312 mg/day for a 70 kg human or 4 mg/kg-d. The confidence in the RfD is medium. The subchronic oral RfD for benzoic acid is also 4E+00 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfDs for benzoic acid are cross-assigned to inhalation. No effects were observed following oral exposures.

The EPA weight of evidence classification for the human carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Benzotriazole

Oral and inhalation RfDs for benzotriazole have not been established (EPA, 1993a,b).

Benzotriazole has not been evaluated by the EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Benzotriazole, Chlorinated

Oral and inhalation RfDs for benzotriazole (chlorinated) have not been established (EPA, 1993a,b).

Benzotriazole (chlorinated) has not been evaluated by the EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Benzo(a)anthracene

EPA (1993a,b) has not established oral or inhalation RfDs for benzo(a)anthracene.

The EPA (1993a) weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence). Although oral and inhalation oral slope factors for benzo(a)anthracene have not been established (EPA, 1993a,b), this compound has been shown to produce liver, lung and skin cancer in animals. Per EPA Region I guidance, the oral slope factor for benzo(a)pyrene (7.3 $(mg/kg\text{-}day)^{-1}$) is assigned to this B2 carcinogen. For selected sites, a second approach is also used in which the chemical-specific toxic equivalency factor (TEF) for benzo(a)anthracene (0.145) developed by ICF-Clement Associates (1987) is applied to the slope factor for benzo(a)pyrene as an additional analysis.

Benzo(a)pyrene

EPA (1993a,b) has not established oral or inhalation RfDs for benzo(a)pyrene.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993). Benzo(a)pyrene has been shown to produce lung and stomach cancer in animals. EPA's (1993a) oral slope factor of 7.3 $(mg/kg\text{-}d)^{-1}$ for benzo(a)pyrene is based on forestomach tumors observed in mice following up to 196 days of dietary exposure to benzo(a)pyrene. The inhalation slope factor for benzo(a)pyrene has not been established (EPA, 1993a,b).

Benzo(e)pyrene

Oral and inhalation RfDs for benzo(e)pyrene have not been established (EPA, 1993a,b).

Benzo(e)pyrene has not been evaluated by the EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Benzo(b)fluoranthene

EPA (1993a,b) has not established oral or inhalation RfDs for benzo(b)fluoranthene.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Although oral and inhalation slope factors for benzo(b)fluoranthene have not been established (EPA, 1993a,b), this compound has been shown to produce lung and thorax carcinomas, lung adenomas and skin tumors in animals. Per EPA Region I guidance, the oral slope factor for benzo(a)pyrene (7.3 $(mg/kg\text{-}day)^{-1}$) is assigned to this B2 carcinogen. For selected sites, a second approach is also used in which the chemical-specific toxic equivalency factor (TEF) for benzo(b)fluoranthene (0.140) developed by ICF-Clement Associates (1987) is applied to the slope factor for benzo(a)pyrene as an additional analysis.

Benzo(g,h,i)perylene

EPA (1993a,b) has not established oral or inhalation RfDs for benzo(g,h,i)perylene.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Benzo(k)fluoranthene

EPA (1993a,b) has not established oral or inhalation RfDs for benzo(k)fluoranthene.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Although oral and inhalation slope factors for benzo(k)fluoranthene have not been established (EPA, 1993a,b), this compound has been shown to produce lung and thorax carcinomas, lung adenomas and skin tumors in animals. Per EPA Region I guidance, the oral slope factor for benzo(a)pyrene (7.3 $(mg/kg\text{-}day)^{-1}$) is assigned to this B2 carcinogen. For selected sites, a second approach is also used in which the chemical-specific toxic equivalency factor (TEF) for benzo(k)fluoranthene (0.066) developed by ICF-Clement Associates (1987) is applied to the slope factors for benzo(a)pyrene as an additional analysis.

Bis(2-chloroethyl)ether

RfDs were not found in IRIS or HEAST (EPA, 1993a,b).

The EPA weight of evidence classification for the human carcinogenic potential of this compound is "B2" - probable human carcinogen (EPA, 1993a). The oral slope factor for this compound has been established as 1.1E+00 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) based on a chronic oral gavage followed by dietary study in mice. Liver tumors were detected in mice given bis(2-chloroethyl)ether for 560 days. An inhalation slope factor of 1.1E+00 $(mg/kg\text{-}d)^{-1}$ was also established based on route-to-route extrapolation of this oral data (EPA, 1993b).

Bis(2-chloroisopropyl)ether

No chronic oral or inhalation RfDs are available for this chemical (EPA, 1993a,b). A subchronic oral RfD of 4E-02 mg/kg-d (EPA, 1993b) has been established based on a two year dietary study in mice. The critical effect was decreased hemoglobin and the uncertainty factor was 1,000. This subchronic oral RfD has been cross-assigned to subchronic inhalation.

The EPA weight of evidence classification for the carcinogenicity of this chemical is "C" - a possible human carcinogen (EPA, 1993b). The oral slope factor is 7E-02 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993b) and is based on the development of liver and lung tumors in a two year gavage study in mice. Based on route-to-route extrapolation of this data, an inhalation slope factor of 3.5E-02 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993b) has been established.

Bis(2-ethylhexyl)phthalate

The chronic oral RfD for Bis(2-ethylhexyl)phthalate (BEHP) is 2E-02 mg/kg-d (EPA, 1993a) and is based on a subchronic feeding study in guinea pigs. Guinea pigs received 19 or 64 mg/kg-d BEHP in their food for 1 year. There were no treatment related toxic effects, however both dose groups had increased liver weights. An uncertainty factor of 1,000 was applied to the LOAEL of 19 mg/kg-d to obtain the RfD. This uncertainty factor was used to account for inter- and intraspecies variability, and a less-than-lifetime exposure. The confidence level in the RfD is medium. The subchronic oral RfD for BEHP is not available (EPA, 1993b), and the chronic oral RfD will be used in this RA. Since EPA (1993a,b) has not established, a chronic inhalation RfD for BEHP, the chronic oral RfD is cross-assigned to inhalation. The subchronic inhalation RfD for BEHP is not established (EPA, 1993b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence). The oral slope factor for BEHP is 1.4E-02 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) and is based on BEHPs ability to produce liver tumors in animals. Since a quantitative estimate of carcinogenic risk from inhalation exposure is not available (EPA, 1992, 1993), the oral slope factor is cross-assigned to inhalation.

Butyl benzyl phthalate

The chronic oral RfD for butyl benzyl phthalate is 2E-01 mg/kg-d (EPA, 1993a) and is based on a subchronic feeding study in rats. Rats received 0, 17, 51, 159, 470, 1417 mg/kg-d butyl benzyl phthalate in their diet for 26 weeks. The LOAEL was 470 mg/kg-d and the critical effects observed were a decrease in body weight, decreased testes' size, decreased organ weights and hematological effects. An uncertainty factor of 1,000 was applied to the NOAEL of 159 mg/kg-d to obtain the RfD. The confidence level in this RfD is medium. The subchronic oral RfD is 2E+00, using an uncertainty factor of 100 (EPA, 1993b). In the absence of inhalation RfDs, the oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "C" - a possible human carcinogen (EPA, 1993a) based upon an increase in mononuclear cell leukemia in female rats fed butyl benzyl phthalate at doses of 0.6000 or 12,000 ppm. A quantitative estimate of carcinogenic risk from oral exposure is not available (EPA, 1993a,b).

Carbazole

EPA (1993a,b) has not established oral or inhalation RfDs for this chemical.

The EPA weight of evidence classification for this chemical was not found (EPA, 1993a,b).

Chrysene

The available data is inadequate for quantitative non-cancer risk assessment (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Although oral and inhalation slope factors for chrysene have not been established (EPA, 1993a,b), this compound has been shown to produce carcinomas and malignant lymphomas in mice after intraperitoneal exposure, and skin carcinomas in mice after dermal exposure. Per EPA Region I guidance, the oral slope factor for benzo(a)pyrene (7.3 $(mg/kg\text{-}day)^{-1}$) is assigned to this B2 carcinogen. For selected sites, a second approach is also used in which the chemical-specific toxic equivalency factor (TEF) for chrysene (0.0044) developed by ICF-Clement Associates (1987) is applied to the slope factor for benzo(a)pyrene as an additional analysis.

Coronene

Oral and inhalation RfDs for coronene have not been established (EPA, 1993a,b).

Coronene has not been evaluated by the EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Dibenzofuran

Data is inadequate for a quantitative risk assessment (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Dibenzo(a,h)anthracene

EPA (1993a,b) has not established oral or inhalation RfDs for dibenzo(a,h)anthracene.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Although oral and inhalation slope factors for dibenzo(a,h)anthracene have not been established (EPA, 1993a,b), this compound has been shown to produce lung and mammary tumors after oral administration, skin carcinomas after dermal exposure, and fibrosarcomas after subcutaneous injection in animals. Per EPA Region I guidance, the oral slope factor for benzo(a)pyrene (7.3 $(mg/kg\text{-}day)^{-1}$) are assigned to this B2 carcinogen. For selected sites, a second approach is also used in which the chemical-specific toxic equivalency factor (TEF) for dibenzo(a,h)anthracene (1.11) developed by ICF-Clement Associates (1987) is applied to the slope factor for benzo(a)pyrene as an additional analysis.

Dichlorobenzene, 1,2-

The chronic oral RfD is 9E-02 mg/kg-d (EPA, 1993a) and is based on a two year gavage study in rats. No adverse effects were observed and an uncertainty factor of 1,000 was applied. The confidence level in this RfD is low. A subchronic oral RfD is not available at this time

(EPA, 1993b). In the absence of a chronic inhalation RfD (EPA, 1993a,b), the chronic oral RfD has been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" (EPA, 1993a).

Dichlorobenzene, 1,4-

No oral RfD was found in either IRIS or HEAST (EPA, 1993a,b).

The chronic inhalation RfD for 1,4-dichlorobenzene has been established as 2.2E-01 mg/kg-d based on an inhalation unit risk of 8E-01 mg/m^3 (EPA, 1993b). The value is based upon an inhalation study in rats. Rats were exposed to 1,4-dichlorobenzene at a concentration of 75 ppm (454.6 mg/m^3) for 5 hours/day, 5 days/week for 76 weeks. The critical effects observed were liver and kidney changes. An uncertainty factor of 100 was applied to obtain the RfD. The chronic inhalation RfC was adopted as the subchronic RfC (EPA, 1993b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "C" - a possible human carcinogen (limited animal evidence, inadequate/no human evidence). The oral slope factor for 1,4-dichlorobenzene is 2.4E-02 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993b). In a 103 week oral gavage study in mice 1,4-dichlorobenzene produced liver tumors. An inhalation slope factor for 1,4-dichlorobenzene is not available (EPA, 1993a,b).

Diethyl phthalate

The chronic oral RfD for diethyl phthalate is 8E-01 mg/kg-d (EPA, 1993a) and is based on a subchronic feeding study in rats. Rats received 0, 150, 770, and 3160 mg/kg-d diethyl phthalate in their diet for 16 weeks. The LOAEL was 3160 mg/kg-d and the critical effects observed were a decrease in body weight, decreased food consumption and altered organ weights. No changes in behavior or other clinical signs of toxicity were observed. An uncertainty factor of 1,000 was applied to the NOAEL of 770 mg/kg-d to obtain the RfD. The confidence level in this RfD is low. A subchronic RfD of 8E+00 mg/kg-d (EPA, 1993b) has been adopted based on an uncertainty factor of 100. Oral toxicity values have been cross-assigned to inhalation in the absence of inhalation RfDs.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Dimethylphenol, 2,4-

The chronic oral RfD for 2,4-dimethylphenol is 2E-02 mg/kg-d (EPA, 1993a) and is based on a subchronic oral gavage study in mice. The critical effects observed were clinical signs (lethargy, prostration, and ataxia) and hematological changes. The LOAEL was 250 mg/kg-d. An uncertainty factor of 3,000 was applied to the NOAEL of 50 mg/kg-d to obtain the RfD. The confidence level in this RfD is low. A subchronic oral RfD of 2E-01 mg/kg-d (EPA, 1993b) is based on an uncertainty factor of 300. Inhalation RfDs are not available at this time (EPA, 1993a,b), so the oral RfD has been cross-assigned to inhalation.

This chemical has not been evaluated by the U.S. EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Di-n-butyl phthalate

The chronic oral RfD for di-n-butyl phthalate is 1E-01 mg/kg-d (EPA, 1993a) and is based on a subchronic feeding study in rats. Rats received 0, 0.01, 0.05, 0.25 and 1.25 percent di-n-butyl phthalate in their diet for 1 year. The LOAEL was 600 mg/kg-d (1.25%) and the critical effect observed was an increase in mortality. No changes in behavior or other clinical signs of toxicity were observed. An uncertainty factor of 1,000 was applied to the NOAEL of 125 mg/kg-d (0.25%) to obtain the RfD. The confidence level in this RfD is low. A subchronic oral RfD of 1E+00 mg/kg-d (EPA, 1993b) is based on an uncertainty factor of 100. In the absence of inhalation RfDs, the oral RfDs have been cross-assigned.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Fluoranthene

The chronic oral RfD for fluoranthene is 4E-02 mg/kg-d (EPA, 1993a) and is based on a subchronic gavage study in mice. Mice received 0, 125, 250, or 500 mg/kg-d fluoranthene by oral gavage for 13 weeks. The LOAEL was 250 mg/kg-d and the critical effects seen were neuropathy, increased salivation, kidney toxicity, increased liver enzymes and hematological/clinical changes. An uncertainty factor of 3000 was applied to the NOAEL of 125 mg/kg-d to obtain the RfD. This uncertainty factor was used to account for inter- and intraspecies variability, the use of subchronic rather than chronic data, and for the lack of additional supporting data. The confidence level in the RfD is low. The subchronic oral RfD for fluoranthene is 4E-01 mg/kg-d (EPA, 1993b). Since EPA (1993a,b) has not established inhalation RfDs for fluoranthene and the oral RfDs are based on systemic effects, the oral RfDs for fluoranthene are cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Fluorene

The chronic oral RfD for fluorene is 4E-02 mg/kg-d (EPA, 1993a) and is based on a subchronic gavage study in mice. Mice received 0, 125, 250, or 500 mg/kg-d fluorene by oral gavage for 13 weeks. The LOAEL was 250 mg/kg-d and the critical effects seen were neuropathy, increased salivation, increased liver enzymes and hematological effects. An uncertainty factor of 3000 was applied to the NOAEL of 125 mg/kg-d to obtain the RfD. The confidence level in this RfD is low. The subchronic oral RfD of 4E-01 mg/kg-d has been established (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Indeno(1,2,3-cd)pyrene

EPA (1993a,b) has not established oral or inhalation RfDs for indeno(1,2,3-cd)pyrene.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Although oral and inhalation slope factors for indeno(1,2,3-cd)pyrene have not been established (EPA, 1993a,b), this compound has been shown to produce lung and thorax tumors following lung implantations, and skin tumors following dermal exposure in animals. Per EPA Region I guidance (EPA, 1993a), the oral slope factor for benzo(a)pyrene (7.3 $(mg/kg\text{-}day)^{-1}$) is assigned to this B2 carcinogen. For selected sites, a second approach is used in which the toxic equivalency factor (TEF) for indeno(1,2,3-cd)pyrene (0.232) developed by

ICF-Clement Associates (1987) is applied to the slope factor for benzo(a)pyrene as an additional analysis.

Methylnaphthalene, 2-

No RfDs were found for 2-methylnaphthalene (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is not available (EPA, 1993a).

Methylphenol, 2-

The chronic oral RfD for 2-methylphenol is 5E-02 mg/kg-d (EPA, 1993a) and is based upon a 90-day subchronic gavage study in rats. The critical effects observed were decreased body weights and neurotoxicity. The LOAEL was 150 mg/kg-d. An uncertainty factor of 1,000 was applied to the NOAEL of 50 mg/kg-d to obtain the RfD. The confidence level in this RfD is medium. The subchronic oral RfD is 5E-01 mg/kg-d (EPA, 1993b). Data is inadequate for the derivation of an inhalation RfD (EPA, 1993a,b). Therefore, the oral RfD has been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "C" - possible human carcinogen (EPA, 1993a) based on increased incidence of skin papillomas in mice in an initiation-promotion study. Oral and inhalation slope factors have not been established (EPA, 1993a,b).

Methylphenol, 4-

The chronic oral RfD for 4-methylphenol is 5E-03 mg/kg-d (EPA, 1993a) and is based on a gavage study done in pregnant rabbits. The rabbits were given 5 mg/kg-d 4-methylphenol on gestation days 6-18. The critical effect was maternal death. An uncertainty factor of 1,000 was applied to obtain the RfD. The subchronic oral RfD is 5E-02 mg/kg-d (EPA, 1993b) and is based on an uncertainty factor of 100. Inhalation RfDs are not available (EPA, 1993a,b). The oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "C" - possible human carcinogen based on an increased incidence of skin papillomas in mice in an initiation-promotion study (EPA, 1993a). A quantitative estimate of carcinogenic risk from oral or inhalation exposure is not available (EPA, 1993a,b).

Naphthalene

The chronic oral RfD for naphthalene was 4E-02 mg/kg-d (EPA, 1992a) and was based on a subchronic gavage study in rats. An uncertainty factor of 1,000 was applied to the LOAEL of 35.7 mg/kg-d to obtain the RfD. The critical effect observed in this study was decreased body weight gain. The subchronic oral RfD was also 4E-02 mg/kg-d (EPA, 1992a). These oral RfDs were withdrawn in the November supplement of the 1992 HEAST. However, for the purpose of this RA, these values will be used in the RA per verbal guidance from EPA Region I. In the absence of inhalation RfDs, these oral RfDs will be cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Nitrophenol, 4-

No RfDs were found in IRIS or HEAST (EPA, 1993a,b). The EPA weight of evidence classification for the carcinogenicity of this chemical was not available (EPA, 1993a,b).

Perylene

Oral and inhalation RfDs for perylene have not been established (EPA, 1993a,b).

Perylene has not been evaluated by the EPA for evidence of human carcinogenic potential (EPA, 1993a,b).

Phenanthrene

The available data is inadequate for quantitative non-cancer risk assessment (EPA, 1993a,b). The toxicity of phenanthrene is likely similar to that of fluoranthene and pyrene which have chronic oral RfDs of 4E-02 and 3E-02 mg/kg-d, respectively (EPA, 1993a).

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Phenol

The chronic oral RfD for phenol is 6E-01 mg/kg-d (EPA, 1993a) and is based upon a developmental study in rats. Pregnant CD rats were administered phenol by gavage at doses of 0, 30, 60, and 120 mg/kg-d on gestational days 6 to 15. The LOAEL was 120 mg/kg-d and the critical effect observed was a highly significant reduction in fetal body weights. An uncertainty factor of 100 was applied to the highest fetal NOAEL in this study (60 mg/kg-d) to obtain the RfD. The confidence level in this RfD is low to medium. The subchronic oral RfD is also 6E-

01 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfD has been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

Pyrene

The chronic oral RfD for pyrene is 3E-02 mg/kg-d (EPA, 1993a) and is based on a subchronic gavage study in mice. Mice received 0, 75, 125, or 250 mg/kg-d pyrene by oral gavage for 13 weeks. The LOAEL was 125 mg/kg-d and the critical effects seen were toxic effects to the kidney including changes to the renal tubular pathology and decreased kidney weight. An uncertainty factor of 3000 was applied to the NOAEL of 75 mg/kg-d to obtain the RfD. This uncertainty factor was used to account for inter- and intraspecies variability, the use of subchronic rather than chronic data, and the lack of additional supporting data. The confidence level in the RfD is low. The subchronic oral RfD for pyrene is 3E-01 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs for pyrene (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation in this RA.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to human carcinogenicity (EPA, 1993a).

TCDD, 2,3,7,8-

Oral and inhalation RfDs are not available for this chemical (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" (EPA, 1993b). 2,3,7,8-TCDD has been shown to produce liver and respiratory system tumors in a rat dietary study. The oral slope factor is 1.5E+05 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993b). The inhalation slope factor is also 1.5E+05 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993b).

A.4 Pesticides/PCBs

Aldrin

The chronic oral RfD for aldrin is 3E-05 mg/kg-d (EPA, 1993a) and is based on a chronic feeding study in rats. Rats were fed aldrin in the diet at levels of 0, 0.5, 2, 10, 50, 100 or 150 ppm for 2 years. The LOAEL was 0.5 ppm diet based on liver toxicity. There was no NOAEL. An uncertainty factor of 1,000 was applied to the LOAEL to obtain the RfD. The confidence level in this RfD is medium. A subchronic oral RfD of 3E-05 mg/kg-d has also been established (EPA, 1993b). Inhalation RfDs are not available at this time (EPA, 1993a,b), and oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the human carcinogenicity of this compound is "B2" - probable human carcinogen (EPA, 1993a). Aldrin has been shown to produce significant increases in liver tumors in three different strains of mice in both males and females. An oral slope factor of 1.7E+01 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) has been established based on the development of liver carcinomas in female and male C3H mice and male B6C3F1 mice. An inhalation unit risk factor of 4.9E-03 $(\mu g/m^3)^{-1}$ (17 $(mg/kg\text{-}d)^{-1}$) (EPA, 1993a,b) was also established based upon the oral data.

BHC, alpha-

No RfDs were found in either IRIS or HEAST (EPA, 1993a,b). For the purpose of this RA, the oral RfDs for gamma-BHC have been used for this chemical.

The EPA weight of evidence classification for the carcinogenicity of alpha-BHC is "B2" - probable human carcinogen (EPA, 1993a). Alpha-BHC has been shown to induce liver tumors in mice and rats. An oral slope factor of 6.3E+00 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) has been established based upon a dietary study in mice. An inhalation unit risk factor of 1.8E-03 $(\mu g/m^3)^{-1}$ (6.3E+00 $(mg/kg\text{-}d)^{-1}$) has been established (EPA, 1993a,b).

BHC, beta-

No RfDs were found in either IRIS or HEAST (EPA, 1993a,b). For the purpose of this RA, the oral RfDs for gamma BHC will be used for this chemical.

The EPA weight of evidence classification for the carcinogenicity of beta-BHC is "C" - possible human carcinogen (EPA, 1993a). Beta-BHC has been shown to produce benign liver tumors in a dietary study in mice. An oral slope factor of 1.8E+00 $(mg/kg\text{-}d)^{-1}$ has been established (EPA, 1993a) based upon a dietary study in mice. An inhalation unit risk factor of 5.3E-04 $(\mu g/m^3)^{-1}$ (1.8E+00 $(mg/kg\text{-}d)^{-1}$) was calculated using data from the same study (EPA, 1993a,b).

BHC, gamma-

The chronic oral RfD for gamma-BHC is 3E-04 mg/kg-d (EPA, 1993a) and is based upon a subchronic oral bioassay in rats. Rats were administered gamma-BHC in the diet at concentrations of 0, 0.2, 0.8, 4, 20 or 100 ppm for 12 weeks. The LOAEL was 20 ppm (converted to 1.55 mg/kg-d) and the critical effects observed were liver and kidney toxicity. An uncertainty factor of 1,000 was applied to the NOAEL of 4 ppm (converted to 0.33 mg/kg-d) to obtain the RfD. The confidence level in this RfD is medium. The subchronic oral RfD is

3E-03 mg/kg-d (EPA, 1993b) and is based on the same study, but applying an uncertainty factor of 100. Inhalation RfDs are not available at this time (EPA, 1993a,b). Thus, for the purposes of this HHRA, the oral RfDs are cross-assigned to inhalation.

The oral slope factor for gamma-BHC is 1.3E+00 mg/kg-d (EPA, 1993b) on the basis of a mouse dietary study. Liver tumors were induced following gamma-BHC administration. The EPA weight-of-evidence classification for the carcinogenicity of gamma-BHC is "B2/C" (EPA, 1993b). In the absence of an inhalation slope factor, the oral slope factor is cross-assigned in this HHRA to inhalation.

Chlordane, alpha-

Gamma-chlordane (CAS #57-74-9) is a mixture of the cis and trans isomers, alpha-chlordane and beta-chlordane. For the purpose of this toxicity profile, the health effects assessment data presented for gamma-chlordane is assumed to be representative of alpha-chlordane as well.

Chlordane, gamma-

The chronic oral RfD for chlordane is 6E-05 mg/kg-d (EPA, 1993a) and is based upon a chronic rat feeding study. Rats were fed chlordane at dietary levels of 0, 1, 5 and 25 ppm for 130 weeks. The LOAEL was 5 ppm (converted to 0.273 mg/kg-d) in female rats and the critical effects observed were liver lesions (hypertrophy). An uncertainty factor of 1,000 was applied to the NOEL of 1 ppm (converted to 0.055 mg/kg-d) to obtain the RfD. The confidence level in this RfD is low. The chronic oral RfD was adopted as the subchronic oral RfD (EPA, 1993b). Inhalation RfDs are not available at this time (EPA, 1993a,b). For the purpose of this RA, the chronic oral RfD has been cross-assigned to the chronic inhalation RfD.

The EPA weight of evidence classification for the carcinogenicity of chlordane is "B2" - probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Chlordane has been shown to produce benign and malignant liver tumors in four strains of mice of both sexes and in F344 male rats. An oral slope factor of 1.3E+00 $(mg/kg\text{-}d)^{-1}$ has been established (EPA, 1993a). An inhalation unit risk factor of 3.7E-04 $(\mu g/m^3)^{-1}$ (1.3E+00 $(mg/kg\text{-}d)^{-1}$) has been established (EPA, 1993a,b) based upon the oral data available.

<u>DDD, 4,4-</u>

No RfDs were found in IRIS or HEAST (EPA, 1993a,b).

In this RA the oral RfD values for 4,4'-DDD have been assigned to 4,4'-DDD. Inhalation RfDs are not available (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen. This chemical has been shown to produce liver tumors in a dietary study in mice. The oral slope factor for 4,4'-DDD is 2.4E-01 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a). No quantitative estimate of carcinogenic risk from inhalation exposure to this chemical is available (EPA, 1993a,b). In this RA the oral slope factor has been cross-assigned to inhalation.

DDE, 4,4-

No RfDs were found in either IRIS or HEAST (EPA, 1993a,b). In this RA the oral RfD value for 4,4'-DDT have been assigned to 4,4'-DDE. Inhalation RfDs are not available (EPA, 1993a,b).

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence). This compound has been shown to produce liver tumors in mice and hamsters and thyroid tumors in female rats. The oral slope factor for 4,4'-DDE is 3.4E-01 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) and is based upon the studies in mice and hamsters. No quantitative estimate of carcinogenic risk from inhalation exposure to this compound is available (EPA, 1993a,b); the oral slope factor has been cross-assigned to inhalation.

DDT, 4,4'-

The chronic oral RfD for 4,4'-DDT is 5E-04 mg/kg-d (EPA, 1993a) and is based on a subchronic feeding study in rats. Rats received 0, 1, 5, 10, or 50 ppm 4,4'-DDT in their food for 15 to 27 weeks. The LOAEL was 0.25 mg/kg-d (5 ppm diet) and the critical effects seen were histopathological effects to the liver. An uncertainty factor of 100 was applied to the NOAEL of 0.05 mg/kg-d (1 ppm diet) to obtain the RfD. This uncertainty factor was used to account for intra- and interspecies variability. The confidence in the RfD is medium. The subchronic oral RfD for 4,4'-DDT is also 5E-04 mg/kg-d (EPA, 1993b). In the absence of EPA non-cancer toxicity values for inhalation (EPA, 1993a,b), the oral RfDs for 4,4'-DDT are cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - a probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). This compound has been shown to produce liver tumors in mice and rats. The oral slope factor for 4,4'-DDT is 3.4E-01 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) and is based upon liver tumors in mice and rats following dietary exposure to 4,4'-DDT. On the basis of route-to-route extrapolation, the inhalation slope factor for 4,4'-DDT has been set at 3.4E-01 $(mg/kg\text{-}d)^{-1}$ (9.7E-05 $(\mu g/m^3)^{-1}$ (EPA, 1993a,b).

<u>Dieldrin</u>

The chronic oral RfD for dieldrin is 5E-05 mg/kg-d (EPA, 1993a) and is based upon a two year rat feeding study. Rats were administered dieldrin for 2 years at dietary concentrations of 0, 0.1, 1.0 or 10.0 ppm. The LOAEL was 1.0 ppm (converted to 0.05 mg/kg-d) and the critical effects observed were increased liver weights and liver parenchymal cell changes including focal proliferation and local hyperplasia. An uncertainty factor of 100 was applied to the NOAEL of 0.1 ppm (converted to 0.005 mg/kg-d) to obtain the RfD. The confidence level in this RfD is medium. The chronic oral RfD was adopted as the subchronic oral RfD (EPA, 1993b). Inhalation RfDs for dieldrin are not available at this time (EPA, 1993a,b). For the purpose of this RA, the oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of dieldrin is "B2" - probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Dieldrin has been shown to be carcinogenic in various strains of mice of both sexes with the effects ranging from benign liver tumors, to hepatocarcinomas to pulmonary metastases. An oral slope factor of 1.6E+01 $(mg/kg\text{-}d)^{-1}$ has been established (EPA, 1993a) on the basis of the above studies. Based on route-to-route extrapolation, the inhalation slope factor has also been set at 1.6E+01 $(mg/kg\text{-}d)^{-1}$ (4.6E-03 $(\mu g/m^3)^{-1}$ (EPA, 1993a,b).

Endosulfan

Endosulfan (CAS #115-29-7), a technical grade material, is a mixture of the two isomers, Endosulfan I (CAS #959-98-8) and Endosulfan II (CAS #33213-65-9). The quantitative risk assessment data presented for Endosulfan is assumed to be representative of the two isomers.

The chronic oral RfD for endosulfan is 6E-03 mg/kg-d (EPA, 1993b) and is based on a 2 year dietary study in rats. The critical effects observed were decreased weight gain, kidney toxicity and aneurysms. The uncertainty factor was 100. The subchronic oral RfD is also 6E-03 mg/kg-d (EPA, 1993b). In the absence of inhalation RfDs (EPA, 1993a,b), the oral RfDs are cross-assigned to inhalation.

This chemical has not been evaluated for evidence of human carcinogenic potential (EPA, 1993a,b).

Endosulfan Sulfate

No RfDs were found in either IRIS or HEAST (EPA, 1993a,b).

The U.S. EPA has not evaluated this chemical for evidence of human carcinogenic potential (EPA, 1993a,b).

Endrin

The chronic oral RfD for endrin is 3E-04 mg/kg-d (EPA, 1993a) and is based upon a chronic oral bioassay in dogs. Dogs were fed diets containing 0.1, 0.5, 1.0, 2.0 or 4.0 ppm endrin for 2 years. The LOAEL was 2 ppm (converted to 0.05 mg/kg-d) and the critical effects observed were occasional convulsions, slightly increased relative liver weights and mild histopathological effects in the liver (slight vacuolization of hepatic cells). An uncertainty factor of 100 was applied to the NOAEL of 1 ppm (converted to 0.025 mg/kg-d) to obtain the RfD. The confidence level in this RfD is medium. The chronic oral RfD has been adopted as the subchronic oral RfD (EPA, 1993b). Inhalation RfDs are not available at this time (EPA, 1993a,b). For the purpose of this RA, oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to carcinogenicity for humans (EPA, 1993a).

Endrin Aldehyde

Endrin aldehyde has been identified as a metabolite of the parent compound endrin. No oral or inhalation RfDs were available for endrin aldehyde (EPA, 1993a,b). While the weight of evidence classification for the human carcinogenicity of the parent compound endrin is "D", the EPA has not specifically evaluated the metabolite endrin aldehyde for its human carcinogenic potential.

Endrin Ketone

Endrin ketone has been identified as a metabolite of Endrin following microbial degradation in soil. No RfDs for endrin ketone were available in either IRIS or HEAST. While the EPA weight of evidence classification for the human carcinogenicity of the parent compound endrin is "D", the U.S. EPA has not specifically evaluated the metabolite endrin ketone for its human carcinogenic potential.

Heptachlor

The chronic oral RfD for heptachlor is 5E-04 mg/kg-d (EPA, 1993a) and is based on a two year feeding study in rats. Rats were fed diets of 0, 1.5, 3, 5, 7 or 10 ppm of heptachlor for 2 years. The LOAEL was 5 ppm (converted to 0.25 mg/kg-d) and the critical effect observed was increased liver weight. An uncertainty factor of 300 was applied to the NOAEL of 3 ppm (converted to 0.15 mg/kg-d) to obtain the RfD. The confidence level in this RfD is low. The chronic oral RfD was adopted as the subchronic oral RfD (EPA, 1993b). Inhalation RfDs for heptachlor are not available at this time (EPA, 1993a,b). For the purpose of this RA, oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - probable human carcinogen (sufficient animal evidence, inadequate/no human evidence) (EPA, 1993a). Heptachlor has been shown to produce liver tumors in mice of both sexes (Davis, 1965; NCI, 1977). An oral slope factor of 4.5E+00 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) has been established based upon the above studies. An inhalation unit risk factor of 1.3E-03 $(\mu g/m^3)^{-1}$ (4.5E+00 $(mg/kg\text{-}d)^{-1}$) has been calculated from the oral data presented above (EPA, 1993a,b).

Heptachlor Epoxide

The chronic oral RfD for heptachlor epoxide is 1.3E-05 mg/kg-d (EPA, 1993a) and is based on a dietary study in dogs. Beagle dogs were fed diets containing 0, 0.5, 2.5, 5 or 7.5 ppm of heptachlor epoxide for 60 weeks. Liver to body weight ratios were significantly increased in a treatment-related fashion. Effects were noted in both males and females at the LEL of 0.5 ppm. There was no NOEL. An uncertainty factor of 1,000 was applied to the LEL (converted to 0.0125 mg/kg-d) to obtain the RfD. The confidence level in this RfD is low. The chronic oral RfD was adopted as the subchronic oral RfD (EPA, 1993b). Inhalation RfDs are not available at this time (EPA, 1993a,b). For the purpose of this RA, oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "B2" - probable human carcinogen. Heptachlor epoxide has been shown to induce liver carcinomas in mice of both sexes and in CFN female rats. The oral slope factor for heptachlor epoxide is 9.1E+00 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a) and is based on the induction of hepatocellular carcinomas in male and female C3H mice and male and female CD-1 mice. An inhalation unit risk factor of 2.6E-03 $(\mu g/m^3)^{-1}$ (9.1E+00 $(mg/kg\text{-}d)^{-1}$) was also calculated from the oral data (EPA, 1993a,b).

Hexachlorobenzene

The chronic oral RfD for hexachlorobenzene is 8E-04 mg/kg-d (EPA, 1993a) and is based upon liver toxicity observed in rats during a chronic dietary study. Rats were fed hexachlorobenzene in their diet at doses of 0, 0.32, 1.6, 8.0, or 40 mg/kg for 90 days prior to mating and until 21 days after weaning. In deriving the RfD, EPA applied an uncertainty factor of 100 to the NOAEL of 1.6 mg/kg (0.08 mg/kg-d). In the absence of a subchronic RfD, the chronic value is cross-assigned in this HHRA to subchronic. The chronic oral RfD is also used to assess chronic inhalation exposures in this HHRA in the absence of an inhalation RfD.

The EPA weight-of-evidence classification for the carcinogenicity of this constituent is "B2" - probable human carcinogen. An oral slope factor of 1.6 $(mg/kg\text{-}d)^{-1}$ has been established by EPA based on liver tumors observed in rats during a two-year dietary study (EPA, 1993a).

The inhalation slope factor is based on the same study and also equals 1.6 $(mg/kg\text{-}d)^{-1}$ (EPA, 1993a,b).

Methoxychlor

The chronic oral RfD for methoxychlor is 5E-03 mg/kg-d (EPA, 1993a) and is based upon a teratology study in rabbits. Pregnant rabbits were administered methoxychlor at doses of 5.01, 35.5 or 251.0 mg/kg-d on days 7 through 19 of gestation. The LOAEL was 35.5 mg/kg-d and the critical effect observed was an excessive loss of litters (abortions). An uncertainty factor of 1,000 was applied to the NOEL of 5.01 mg/kg-d to obtain the RfD. The confidence in this oral RfD is low. The chronic oral RfD was adopted as the subchronic oral RfD (EPA, 1993b). Inhalation RfDs are not available at this time (EPA, 1993a,b). For the purpose of this RA, oral RfDs have been cross-assigned to inhalation.

The EPA weight of evidence classification for the carcinogenicity of this compound is "D" - not classifiable as to carcinogenicity for humans (EPA, 1993a).

PCBs

EPA (1993a,b) has not established oral or inhalation RfDs for any individual Aroclor or for PCBs combined.

The EPA weight of evidence classification for the carcinogenicity of PCBs is "B2" - probable human carcinogen (sufficient animal evidence, inadequate/no human evidence (EPA, 1993a). PCBs have been shown to produce liver tumors in rats and mice. In humans, the available data are inadequate but provide suggestive evidence of excess risk of liver cancer from ingestion and inhalation or dermal contact. An oral slope factor of 7.7 $(mg/kg\text{-}d)^{-1}$ has been established for PCBs (EPA, 1993a) based on a dietary study in rats. Liver lesions and carcinomas were observed in rats exposed to 100 ppm Aroclor 1260 in corn oil for 16 months, followed by 50 ppm exposure for 8 months and a basal diet for 5 months. Since a quantitative estimate of carcinogenic risk from inhalation exposure is not available (EPA, 1993a,b), the oral slope factor is cross-assigned to inhalation. Aroclor-specific slope factors are not available.

APPENDIX B

COMPREHENSIVE REUSE PLAN

COMPREHENSIVE REUSE PLAN
DAVISVILLE NAVAL CONSTRUCTION BATTALION CENTER
DEVELOPMENT REUSE SCENARIOS

September 1993

WELCOME!

The Base Reuse Committee (BRC) which is composed of State, Local and Tribal representatives is responsible for preparing a Reuse Plan for the Davisville Naval Construction Battalion Center. The BRC is sponsoring this public meeting to provide you with the opportunity to take part in the process. The purpose of this meeting is to solicit your thoughts and suggestions on the future reuse scenarios. Three reuse scenarios have been developed by the BRC which represents different potential land users. Based on your comments, the BRC will develop a preferred development plan.

Formulating the Reuse Scenarios

The development of the scenarios consider the assets of the land and buildings at Davisville; the resources and constraints to development; the potential for new economic development activity; the interest expressed in using facilities at Davisville; the compatibility with adjacent residential and Quonset development and the and the Goals of the Community (See Figure 1). These factors are generally combined into development concepts or assumptions which guide the formulation of the alternative scenarios.

The concepts provide the framework which ties the development scenarios together. The scenarios are developed to learn which land uses may be the closest to the desired result. The development concepts are the common thread running through each scenario even though their land uses may be radically different. The formulation of the development scenarios for Davisville is based on two concepts. The first concept is that the reuse plan should view the surplus property not as a whole but in a sectional development approach. The second concept is that the reuse plan needs to consider users who have expressed interests in the property.

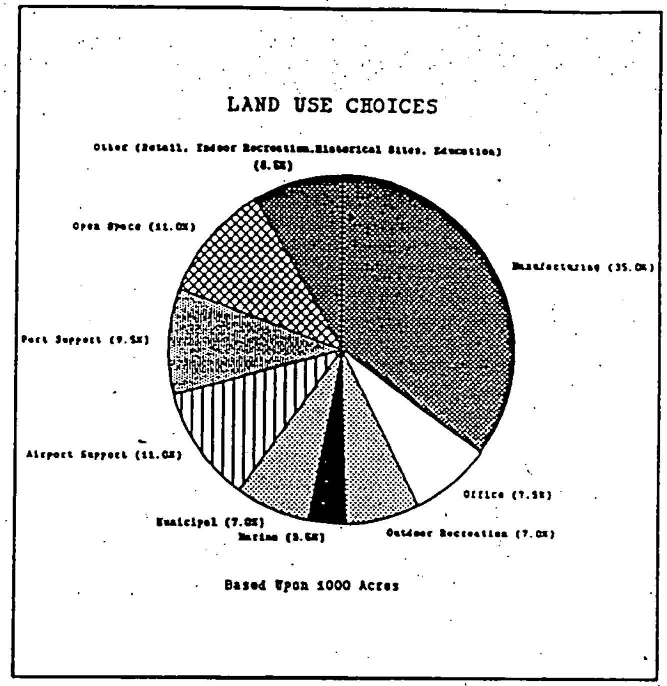


Figure 1 Land Use Choices from Community Survey

Sectional Approach

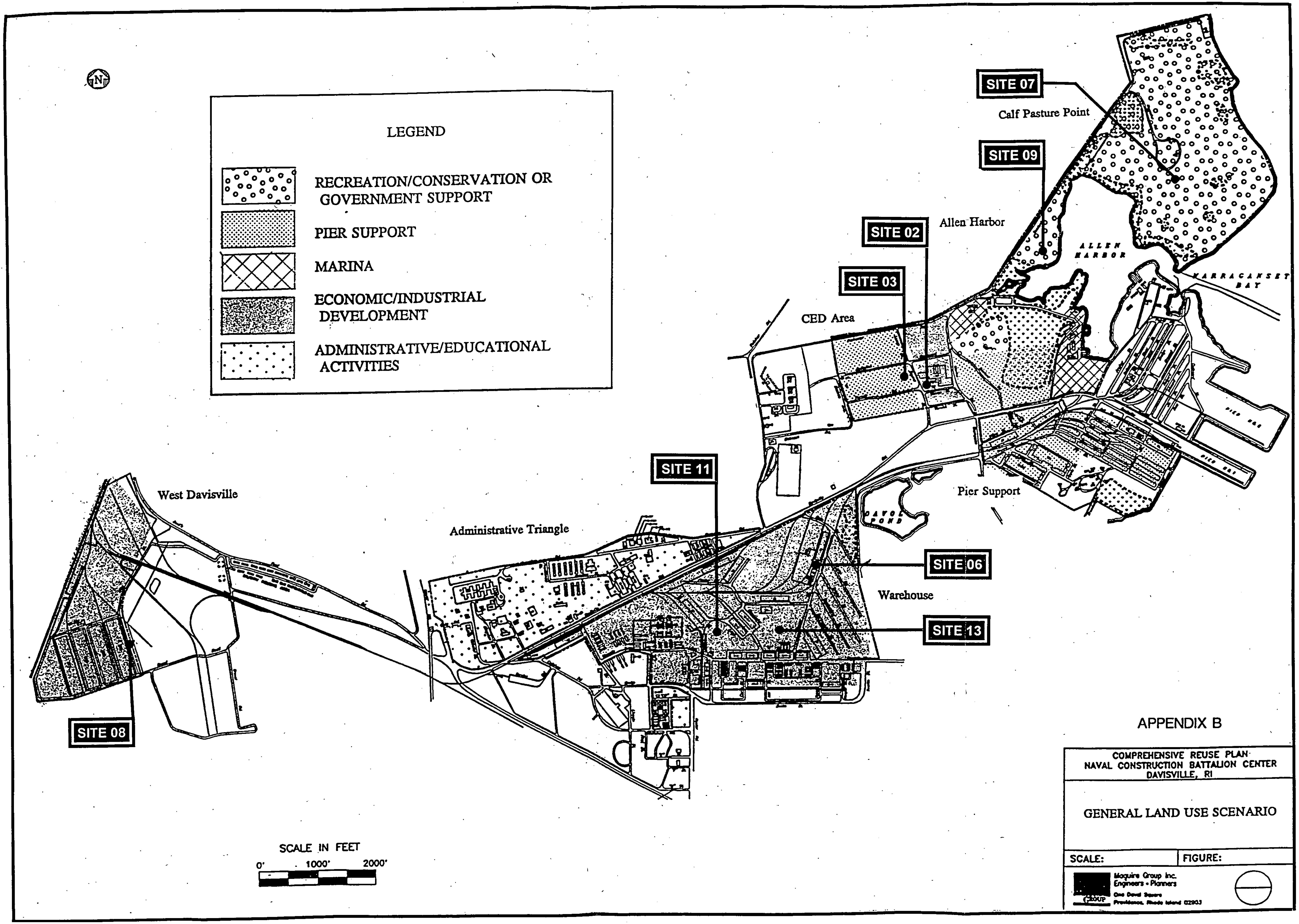
The sectional approach views Davisville as a series of land areas each with their own individual character and inherent opportunities and constraints. Land at Davisville may be logically grouped into seven development parcels; West Davisville, Administrative Triangle, Warehouse Area, Construction Equipment Department Area (CED), Davisville Pier Support Area, Calf Pasture Point and Allen Harbor.

Property Interest

The best opportunity to create the nucleus of facilities that will help generate new development is with the organizations which have expressed an interest in using the property. The development of the reuse alternatives is based on accommodating these interests to varying degrees.

REUSE DEVELOPMENT SCENARIOS

SCENARIO NO. 1	SCENARIO NO. 2	SCENARIO NO. 3
WEST DAVISVILLE AREA		
Three development subparcels are identified in this scenario. Two subparcels to support two of the four existing buildings. The third parcel is designated for single or multi-use industrial development.	Five development subparcels are created in this scenario. Four for the existing buildings and a fifth parcels for an industrial park or a single industrial user.	One subparcels is identified for single or multi-use industrial development. All the buildings will be demolished.
ADMINISTRATIVE TRIANGLE AREA		
Seven development subparcels are identified in this scenario. Two subparcels for government support activities; one parcel for educational activities; an existing natural area and three parcels for office use.	(Same as Scenario No. 1)	(Same as Scenario No. 1)
WAREHOUSE AREA		
Industrial park with a realignment internal access roadway. Six subparcels for existing building sites. A ten acre parcel for the existing health research activities. Camp Endicott Historical District.	Same as Scenario No. 1 except a 5 acres subparcel is created for government support activities.	(Same as Scenario No. 1)
CED AREA		
Used for open storage for the Port of Davisville. Subparcels for dredge disposal, wetland and natural areas. West Allen Harbor is designated for a marina.	Two parcels are created in this scenario. One parcel used for recreational activities. West Allen Harbor is designated for government support activities.	One parcel is shown in this scenario for a destination theme park.
PIER SUPPORT AREA		
Pier laydown and storage activities. Subparcels for government warehouse area and existing building sites. Conference center for the former US Navy housing area. A subparcel for wetland area.	This Scenario essentially divided the land area between pier support activities and the fishing industry. In conjunction with the fishing industries, the housing area is designated for aquaculture.	This scenario is similar to either Scenario No. 1 or 2 except that the housing area is used for residential development.
CALF PASTURE POINT		
Recreation and Conservation	Government Support	Limited low intensity development on the central area.
ALLEN HARBOR		
Recreation and Conservation	Government Support	Hazardous Waste Clean-Up


N
LEGEND
RECREATION/CONSERVATION OR GOVERNMENT SUPPORT
PIER SUPPORT
MARINA
ECONOMIC/INDUSTRIAL DEVELOPMENT
ADMINISTRATIVE/EDUCATIONAL ACTIVITIES
SITE 07
Calf Pasture Point
SITE 09
Allen Harbor
SITE 02
ALLEN HARBOR
SITE 03
NARRAGANSETT BAY
CED Area
SITE 11
Pier Support
DAVOL POND
West Davisville
Administrative Triangle
SITE 06
Warehouse
SITE 13
SITE 08
SCALE IN FEET
0' 1000' 2000'
APPENDIX B
COMPREHENSIVE REUSE PLAN
NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RI
GENERAL LAND USE SCENARIO
SCALE:
FIGURE:
Maguire Group Inc.
Engineers • Planners

APPENDIX C

SITE 09: SURFACE SOIL, SUBSURFACE SOIL, GROUND WATER, SURFACE WATER, AND SHELLFISH DATA

LIST OF TABLES

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

PHASE I

TRC SAMPLE IDENTIFICATION:	S-09-01-00-S Soil	S-09-02-00-S Soil	S-09-03-00-S Soil	S-09-04-00-S Soil	S-09-05-00-S Soil	S-09-06-00-S Soil	TP-1-00-S Soil	TP-2-00-S Soil	TP-3-00-S Soil	TP-4-00-S Soil	TP-5-00-S Soil
INORGANICS (mg/kg)											
Aluminum	4710	3260	9930	8850	37900	4170	4500	7130	4860	6860	8880
Antimony	25	65.3	23.8	21	10.1	11	10.8	12.7	11.1	12	11.3
Arsenic	11.3	32.5	10.7	16.5	3.1	2.6	2.2	4.7	2.2	1	0.98
Barium	97.4	74	59.8	221	1190	10	75	99.9	54.4	7.1	12.7
Beryllium	0.83	1.3	1.2	1	75.4	0.15	1.5	1.5	1.5	1.2	1.6
Cadmium	5.8	4.1	5	11.2	0.89	0.97	16.1	16.5	7	1.1	0.99
Calcium	2650	4000	5360	3600	32800	511	1090	4050	669	133	238
Chromium	176	560	67.5	65.7	955	18.5	22.2	46.9	19.4	3	5.1
Cobalt	32.9	59.8	14.8	33.1	431	4.2	6.6	25.2	6.8	1.9	4
Copper	1210	1730	315	444	24700	62.8	118	223	5730	2.7	4.4
Cyanide	0.67	0.69	1.2	1.1	0.51	0.55	1.1	0.63	0.57	0.6	0.57
Iron	144000	369000	58000	143000	303000	11500	16800	21900	12700	6060	10400
Lead	1140	4070	370	656	8710	90.8	825	481	553	3.8	11.8
Magnesium	2700	3380	5420	7650	14600	1460	1070	1990	1430	373	753
Manganese	901	1160	212	509	2920	82.8	192	282	171	54.7	77.2
Mercury	1.4	0.23	0.33	0.46	2	0.21	0.43	1.2	0.57	0.11	0.11
Nickel	148	92.5	34.3	56.8	4210	7.9	20.4	112	24.5	8.6	8
Potassium	1570	721	1430	846	1960	444	435	511	448	484	578
Selenium	0.42	0.44	0.73	3.4	3.2	0.36	3.6	4	3.6	0.37	3.6
Silver	6.5	3.1	4.3	3.7	33.1	1.3	1.8	7.5	6.5	1.4	1.3
Sodium	5060	4120	10700	4120	3560	464	403	473	414	448	420
Thallium	1.7	1.8	3	2.8	0.26	0.29	0.29	0.33	0.29	0.3	0.3
Vanadium	134	77.9	69.3	61.5	114	17.6	21.7	45.9	25	7.2	11.2
Zinc	1890	2470	757	1150	34300	72.3	379	763	407	23.7	36.1

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

PHASE I

TRC SAMPLE IDENTIFICATION:	S-09-01-00-S Soil	S-09-02-00-S Soil	S-09-03-00-S Soil	S-09-04-00-S Soil	S-09-05-00-S Soil	S-09-06-00-S Soil	TP-1-00-S Soil	TP-2-00-S Soil	TP-3-00-S Soil	TP-4-00-S Soil	TP-5-00-S Soil
VOLATILES (ug/kg)											
1,1-Dichloroethane	7	7	12	11	5	6	6	6	6	6	6
1,1-Dichloroethene	7	7	12	11	5	6	6	6	6	6	6
1,1,1-Trichloroethane	7	7	12	11	5	6	6	6	6	6	6
1,1,2-Trichloroethane	7	7	12	11	5	6	6	6	6	6	6
1,1,2,2-Tetrachloroethane	7	7	12	11	5	6	6	6	6	6	6
1,2-Dichloroethane	7	7	12	11	5	6	6	6	6	6	6
1,2-Dichloroethene(Total)	7	7	12	11	5	6	6	6	6	6	6
1,2-Dichloropropane	7	7	12	11	5	6	6	6	6	6	6
2-Butanone	14	14	24	22	10	11	11	13	11	12	11
2-Hexanone	14	14	24	22	10	11	11	13	11	12	11
4-Methyl-2-pentanone	14	14	24	22	10	11	11	13	11	12	11
Acetone	110	14	55	60	30	44	10	13	14	15	11
Benzene	7	7	12	11	5	6	6	6	6	6	6
Bromodichloromethane	7	7	12	11	5	6	6	6	6	6	6
Bromoform	7	7	12	11	5	6	6	6	6	6	6
Bromomethane	14	14	24	22	10	11	11	13	11	12	11
Carbon disulfide	7	7	12	11	5	6	6	6	6	6	6
Carbon tetrachloride	7	7	12	11	5	6	6	6	6	6	6
Chlorobenzene	7	7	12	11	5	6	6	6	6	6	6
Chloroethane	14	14	24	22	10	11	11	13	11	12	11
Chloroform	7	7	16	11	5	1	5	5	2	2	6
Chloromethane	14	14	24	22	10	11	11	13	11	12	11
Cis-1,3-Dichloropropene	7	7	12	11	5	6	6	6	6	6	6
Dibromochloromethane	7	7	12	11	5	6	6	6	6	6	6
Ethylbenzene	7	7	12	11	5	6	6	6	6	6	6
Methylene chloride	30	27	60	77	15	100	27	20	30	14	13
Styrene	7	7	12	11	5	6	6	6	6	6	6
Tetrachloroethene	7	7	12	11	5	6	6	6	6	6	6
Toluene	3.5	3.5	6	5.5	2.5	3	3	3	3	3	3
Trans-1,3-Dichloropropene	7	7	12	11	5	6	6	6	6	6	6
Trichloroethene	7	7	12	11	5	6	6	6	6	6	6
Vinyl acetate	14	14	24	22	10	11	11	13	11	12	11
Vinyl chloride	14	14	24	22	10	11	11	13	11	12	11
Xylenes (Total)	7	7	12	11	5	6	6	6	6	6	6

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION:	PHASE I S-09-01-00-S Soil	S-09-02-00-S Soil	S-09-03-00-S Soil	S-09-04-00-S Soil	S-09-05-00-S Soil	S-09-06-00-S Soil	TP-1-00-S Soil	TP-2-00-S Soil	TP-3-00-S Soil	TP-4-00-S Soil	TP-5-00-S Soil
SEMIVOLATILES (ug/kg)											
1,2-Dichlorobenzene	450	460	790	720	340	370	370	420	380	390	380
1,2,4-Trichlorobenzene	450	460	395	360	340	370	370	420	380	390	380
1,3-Dichlorobenzene	450	460	790	720	340	370	370	420	380	390	380
1,4-Dichlorobenzene	450	460	790	720	340	370	370	420	380	390	380
2-Chloronaphthalene	450	460	790	720	340	370	370	420	380	390	380
2-Chlorophenol	450	460	790	720	340	370	370	420	380	390	380
2-Methylnaphthalene	450	460	790	720	340	370	370	420	42	390	380
2-Methylphenol	450	460	790	720	340	370	370	420	380	390	380
2-Nitroaniline	2200	2200	3800	3500	1600	1800	1800	2100	1800	1900	1800
2-Nitrophenol	450	460	790	720	340	370	370	420	380	390	380
2,4-Dichlorophenol	450	460	790	720	340	370	370	420	380	390	380
2,4-Dimethylphenol	450	460	395	360	340	370	370	420	380	390	380
2,4-Dinitrophenol	2200	2200	3800	3500	1600	1800	1800	2100	1800	1900	1800
2,4-Dinitrotoluene	450	460	790	720	340	370	370	420	380	390	380
2,4,5-Trichlorophenol	2200	2200	3800	3500	1600	1800	1800	2100	1800	1900	1800
2,4,6-Trichlorophenol	450	460	790	720	340	370	370	420	380	390	380
2,6-Dinitrotoluene	450	460	790	720	340	370	370	420	380	390	380
3-Nitroaniline	2200	2200	3800	3500	1600	1800	1800	2100	1800	1900	1800
3,3'-Dichlorobenzidine	900	920	1600	1400	670	730	730	850	760	790	760
4-Bromophenyl phenyl ether	450	460	790	720	340	370	370	420	380	390	380
4-Chloro-3-methylphenol	450	460	790	720	340	370	370	420	380	390	380
4-Chloroaniline	450	460	790	720	340	370	370	420	380	390	380
4-Chlorophenyl phenyl ether	450	460	790	720	340	370	370	420	380	390	380
4-Methylphenol	450	460	790	720	340	370	370	420	380	390	380
4-Nitroaniline	2200	2200	3800	3500	1600	1800	1800	2100	1800	1900	1800
4-Nitrophenol	2200	2200	3800	3500	1600	1800	1800	2100	1800	1900	1800
4,6-Dinitro-2-methylphenol	2200	2200	3800	3500	1600	1800	1800	2100	1800	1900	1800
Acenaphthene	120	160	150	86	340	130	50	420	94	390	380
Acenaphthylene	450	460	790	720	340	370	370	420	81	390	380
Anthracene	270	360	190	79	340	280	130	420	180	390	380
Benzoic acid	63	1100	210	875	800	110	870	1050	350	950	180
Benzo(a)anthracene	980	810	610	350	170	810	480	120	1300	390	380
Benzo(a)pyrene	780	600	540	440	140	650	470	210	1400	390	380
Benzo(b)fluoranthene											
Benzo(b)/Benzo(k)fluoranthene	1500	1200	970	770	330	1100	800	390	3800	390	380
Benzo(g,h,i)perylene	260	210	240	240	130	520	290	390	1100	390	380
Benzo(k)fluoranthene											
Benzyl alcohol	450	460	790	720	340	370	370	420	380	390	380
bis(2-Chloroethoxy)methane	450	460	790	720	340	370	370	420	380	390	380
bis(2-Chloroethyl)ether	450	460	790	720	340	370	370	420	380	390	380
bis(2-Chloroisopropyl)ether (a)	450	460	790	720	340	370	370	420	380	390	380
bis(2-Ethylhexyl)phthalate	400	620	1000	530	1600	75	150	160	240	390	380
Butyl benzyl phthalate	450	460	790	720	38	370	370	81	380	390	380
Carbazole											
Chrysene	1000	890	690	420	250	950	540	160	1700	390	380
Dibenzofuran	71	87	86	360	170	63	185	210	42	195	190
Dibenzo(a,h)anthracene	170	120	170	120	51	290	84	59	440	390	380
Diethyl phthalate	225	230	395	360	170	185	185	210	190	195	190
Dimethyl phthalate	450	460	790	720	340	370	370	420	380	390	380
Di-n-butyl phthalate	190	460	190	720	170	370	370	420	380	390	380
Di-n-octyl phthalate	450	460	790	720	340	370	370	420	380	390	380
Fluoranthene	1700	1700	1300	620	350	1400	990	150	2400	390	380
Fluorene	150	160	160	84	170	130	58	420	88	195	190
Hexachlorobe[illegible]	450	460	790	720	340	370	370	420	380	390	380

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

PHASE I

TRC SAMPLE IDENTIFICATION:	S-09-01-00-S Soil	S-09-02-00-S Soil	S-09-03-00-S Soil	S-09-04-00-S Soil	S-09-05-00-S Soil	S-09-06-00-S Soil	TP-1-00-S Soil	TP-2-00-S Soil	TP-3-00-S Soil	TP-4-00-S Soil	TP-5-00-S Soil
Hexachlorobutadiene	450	460	790	720	340	370	370	420	380	390	380
Hexachlorocyclopentadiene	450	460	790	720	340	370	370	420	380	390	380
Hexachloroethane	450	460	790	720	340	370	370	420	380	390	380
Indeno(1,2,3-cd)pyrene	280	210	240	210	120	490	200	250	1200	390	380
Isophorone	450	460	790	720	340	370	370	420	380	390	380
Naphthalene	450	460	790	120	340	370	370	420	41	390	380
Nitrobenzene	450	460	790	720	340	370	370	420	380	390	380
N-Nitroso-di-n-propylamine	450	460	790	720	340	370	370	420	380	390	380
N-Nitrosodiphenylamine(1)	450	460	790	720	340	370	370	420	380	390	380
Pentachlorophenol	550	550	950	875	400	450	450	525	450	475	450
Phenanthrene	1300	1400	1200	460	150	1400	800	65	1100	390	380
Phenol	450	460	790	720	340	370	370	420	380	390	380
Pyrene	1300	1300	1100	530	400	1400	730	160	1900	390	380
2,3,7,8-TCDD											
PESTICIDES/PCBs (ug/kg)											
4,4'-DDD	22	110	190	175	16	18	18	20	18	19	18
4,4'-DDE	22	110	190	175	16	18	18	20	18	19	18
4,4'-DDT	22	110	190	175	16	18	18	20	18	19	18
Aldrin	11	55	95	85	8.2	8.9	8.9	10	9.2	9.5	9.2
Alpha chlordane	55	1100	950	850	41	44.5	44.5	50	46	47.5	46
Alpha-BHC	5.5	55	95	85	4.1	4.45	4.45	5	4.6	4.75	4.6
Beta-BHC	11	55	95	85	8.2	8.9	8.9	10	9.2	9.5	9.2
Delta-BHC	5.5	55	95	85	4.1	4.45	4.45	5	4.6	4.75	4.6
Dieldrin	22	110	190	175	16	18	18	20	18	19	18
Endosulfan I	11	55	95	85	8.2	8.9	8.9	10	9.2	9.5	9.2
Endosulfan II	11	110	190	175	8	9	9	10	9	9.5	9
Endosulfan sulfate	22	110	190	175	16	18	18	20	18	19	18
Endrin	22	110	190	175	16	18	18	20	18	19	18
Endrin aldehyde											
Endrin ketone	22	110	190	175	16	18	18	20	18	19	18
Gamma chlordane	55	550	950	850	41	44.5	44.5	50	46	47.5	46
Gamma-BHC (Lindane)	11	55	95	85	8.2	8.9	8.9	10	9.2	9.5	9.2
Heptachlor	11	55	95	85	8.2	8.9	8.9	10	9.2	9.5	9.2
Heptachlor epoxide	11	55	95	85	8.2	8.9	8.9	10	9.2	9.5	9.2
PCB-1016	110	550	950	850	82	89	89	100	92	95	92
PCB-1221	110	550	950	850	82	89	89	100	92	95	92
PCB-1232	110	550	950	850	82	89	89	100	92	95	92
PCB-1242	110	550	950	850	82	89	89	100	92	95	92
PCB-1248	110	550	950	850	82	89	89	100	92	95	92
PCB-1254	220	1100	1900	1750	160	180	180	200	2600	190	180
PCB-1260	220	1100	1900	1750	160	340	840	520	2300	190	180
p,p'-Methoxychlor	110	550	950	850	82	89	89	100	92	95	92
Toxaphene	220	1100	1900	1750	160	180	180	200	180	190	180

Bolded : 1/2 SQL
Shaded : Detected value
Italicised : Data averaged with duplicate
Dark shaded : Rejected data
(a) Reported as bis(2-chloroisopropyl)ether in Phase I and as 2,2'-oxybis(1-chloropropane) in Phase II

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	TP-6-00-S	TP-7-00-S	TP-8-00-S	TP-9-00-S	B-09-01-00-S	B-09-02-00-S	B-09-03-00-S	PHASE II 09-SS01	09-SS02	09-SS03	09-SS04	09-SS05	09-SS06
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
												w/09-SS08	
								550419	550420	550421	550422	550423	550424
INORGANICS (mg/kg)													
Aluminum	5450	2370	18000	3030	6340	4550	4390	7400	5550	4040	3130	*6580*	3930
Antimony	10.7	10.1	10.3	11	5.6	6.2	5.9	10.4	10.4	9.7	9.8	*9.55*	9.9
Arsenic	1.9	0.44	2.2	1.6	5	0.98	1.6	3.3	2.5	2.1	1.9	1.9	1.2
Barium	55.7	22.2	492	12.2	21.3	11.4	8.5	22.6	20.4	10.3	10	*71.35*	9.7
Beryllium	3	3	27.4	0.9	0.21	0.23	0.22	0.65	0.57	0.42	0.43	*3.45*	1.1
Cadmium	3.7	0.89	1.1	1.2	27	1.2	1.1	1.1	1.6	0.16	0.088	*8.75*	0.11
Calcium	1670	841	10700	995	607	335	213	490	763	1510	716	*2210*	279
Chromium	25.8	12.8	469	5	9.4	3.3	5.2	15	19.3	6.2	6.1	*62.95*	3.8
Cobalt	16	10	181	3.8	10.9	2.4	5.7	3.9	4.2	3.1	2.7	*17.4*	3.8
Copper	222	191	4340	17.8	24.2	6.5	6.7	579	44.4	13.6	11.9	*394*	12.8
Cyanide	0.54	0.51	0.53	0.57	0.54	0.61	0.54	0.56	0.56	0.53	0.53	*0.52*	0.54
Iron	16000	10200	113000	7970	18300	7900	9250	10600	11000	8400	7350	*21900*	9750
Lead	251	187	3070	14.6	25.5	9.9	6.5	72.1	88.9	8.3	5.1	*612.5*	10.9
Magnesium	1330	689	6100	1130	2670	768	1130	1220	1540	1290	1080	*1675*	957
Manganese	266	144	1180	85.7	207	105	141	127	198	89.2	76.3	*278*	166
Mercury	0.33	0.1	0.29	0.1	0.11	0.12	0.1	0.5	0.42	0.11	0.11	0.78	0.11
Nickel	92	75	1490	7.9	12.8	8.8	12.3	7	7	6.6	6.6	*156*	6.6
Potassium	512	407	1100	684	1030	137	128	541	504	651	477	690	479
Selenium	3.4	3.2	3.1	1.8	0.43	0.48	0.43	0.68	0.68	0.63	0.64	*0.62*	0.64
Silver	1.2	1.1	3.4	1.3	1.4	0.69	0.65	0.42	0.36	0.042	0.069	0.43	0.1
Sodium	400	377	382	411	391	217	204	89.9	70.8	95.4	134	*337.5*	75.2
Thallium	0.28	0.26	0.28	0.35	0.43	0.48	0.43	0.9	0.9	0.85	0.85	0.83	0.86
Vanadium	25.2	8.2	63.7	9.5	20.8	9.8	4.5	13.2	11.9	7.9	7.1	53.5	5.3
Zinc	1440	994	12700	44.3	58.8	75.3	26.4	68.2	101	24.6	19.2	1640	71.9

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	TP-6-00-S Soil	TP-7-00-S Soil	TP-8-00-S Soil	TP-9-00-S Soil	B-09-01-00-S Soil	B-09-02-00-S Soil	B-09-03-00-S Soil	PHASE II 09-SS01 Soil	09-SS02 Soil	09-SS03 Soil	09-SS04 Soil	09-SS05 Soil	09-SS06 Soil
												w/09-SS08	
								550419	550420	550421	550422		550424
VOLATILES (ug/kg)													
1,1-Dichloroethane	5	5	5	6	5	6	5	11	11	11	11	10	11
1,1-Dichloroethene	5	5	5	6	5	6	5	11	11	11	11	10	11
1,1,1-Trichloroethane	5	5	5	6	5	6	5	2	11	11	11	3	11
1,1,2-Trichloroethane	5	5	5	6	5	6	5	11	11	11	11	10	11
1,1,2,2-Tetrachloroethane	5	5	5	6	5	6	5	11	11	11	11	10	11
1,2-Dichloroethane	5	5	5	6	5	6	5	11	11	11	11	10	11
1,2-Dichloroethene(Total)	5	5	5	6	5	6	5	11	11	11	11	10	11
1,2-Dichloropropane	5	5	5	6	5	6	5	11	11	11	11	10	11
2-Butanone	11	10	11	11	11	12	11	11	11	11	11	10	11
2-Hexanone	11	10	11	11	11	12	11	11	11	11	11	10	11
4-Methyl-2-pentanone	11	10	11	11	11	12	11	11	11	11	11	10	11
Acetone	14	24	19	12	15	31	14	11	11	11	18	11.5	21
Benzene	5	5	5	6	5	6	5	11	11	11	11	10	11
Bromodichloromethane	5	5	5	6	5	6	5	11	11	11	11	10	11
Bromoform	5	5	5	6	5	6	5	11	11	11	11	10	11
Bromomethane	11	10	11	11	11	12	11	11	11	11	11	10	11
Carbon disulfide	5	5	5	6	5	6	5	11	11	11	11	10	11
Carbon tetrachloride	5	5	5	6	5	6	5	11	11	11	11	10	11
Chlorobenzene	5	5	5	6	5	6	5	11	11	11	11	10	11
Chloroethane	11	10	11	11	11	12	11	11	11	11	11	10	11
Chloroform	5	5	2	6	5	1	1	11	11	11	11	10	11
Chloromethane	11	10	11	11	11	12	11	11	11	11	11	10	11
Cis-1,3-Dichloropropene	5	5	5	6	5	6	5	11	11	11	11	10	11
Dibromochloromethane	5	5	5	6	5	6	5	11	11	11	11	10	11
Ethylbenzene	5	5	5	6	5	6	5	11	11	11	11	10	11
Methylene chloride	9	11	15	10	22	18	24	12	33	18	57	15	28
Styrene	5	5	5	6	5	6	5	11	11	11	11	10	11
Tetrachloroethene	5	5	5	6	5	6	5	11	11	11	11	10	11
Toluene	2.5	2.5	2.5	3	2.5	3	2.5	5.5	5.5	5.5	5.5	5	5.5
Trans-1,3-Dichloropropene	5	5	5	6	5	6	5	11	11	11	11	10	11
Trichloroethene	5	5	5	6	5	6	5	11	11	11	11	10	11
Vinyl acetate	11	10	11	11	11	12	11						
Vinyl chloride	11	10	11	11	11	12	11	11	11	11	11	10	11
Xylenes (Total)	5	5	5	6	5	6	5	11	11	11	11	10	11

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

								PHASE II					
TRC SAMPLE IDENTIFICATION:	TP-6-00-S	TP-7-00-S	TP-8-00-S	TP-9-00-S	B-09-01-00-S	B-09-02-00-S	B-09-03-00-S	09-SS01	09-SS02	09-SS03	09-SS04	09-SS05	09-SS06
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
												w/09-SS08	
								550405	550406	550407	550408		550410
SEMIVOLATILES (ug/kg)													
1,2-Dichlorobenzene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
1,2,4-Trichlorobenzene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
1,3-Dichlorobenzene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
1,4-Dichlorobenzene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2-Chloronaphthalene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2-Chlorophenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2-Methylnaphthalene	350	340	350	380	360	400	360	370	370	350	350	110	350
2-Methylphenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2-Nitroaniline	1700	1600	1700	1800	1700	2000	1700	890	890	840	850	*815*	850
2-Nitrophenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2,4-Dichlorophenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2,4-Dimethylphenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2,4-Dinitrophenol	1700	1600	1700	1800	1700	2000	1700	890	890	840	850	*815*	850
2,4-Dinitrotoluene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2,4,5-Trichlorophenol	1700	1600	1700	1800	1700	2000	1700	890	890	840	850	*815*	850
2,4,6-Trichlorophenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
2,6-Dinitrotoluene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
3-Nitroaniline	1700	1600	1700	1800	1700	2000	1700	890	890	840	850	*815*	850
3,3'-Dichlorobenzidine	710	680	710	760	720	810	720	370	370	350	350	*340*	350
4-Bromophenyl phenyl ether	350	340	350	380	360	400	360	370	370	350	350	*340*	350
4-Chloro-3-methylphenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
4-Chloroaniline	350	340	350	380	360	400	360	370	370	350	350	*340*	350
4-Chlorophenyl phenyl ether	350	340	350	380	360	400	360	370	370	350	350	*340*	350
4-Methylphenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
4-Nitroaniline	1700	1600	1700	1800	1700	2000	1700	890	890	840	850	*815*	850
4-Nitrophenol	1700	1600	1700	1800	1700	2000	1700	890	890	840	850	*815*	850
4,6-Dinitro-2-methylphenol	1700	1600	1700	1800	1700	2000	1700	890	890	840	850	*815*	850
Acenaphthene	110	340	270	380	38	400	360	370	370	73	350	720	350
Acenaphthylene	350	340	350	380	360	400	360	370	370	350	350	36	350
Anthracene	180	340	520	380	78	400	360	370	51	130	350	1100	350
Benzoic acid	850	800	49	900	850	1000	850						
Benzo(a)anthracene	660	150	1300	380	410	400	360	44	350	310	350	*2850*	350
Benzo(a)pyrene	630	130	980	380	160	400	360	370	210	220	350	*2200*	350
Benzo(b)fluoranthene					120	400	360	130	530	440	350	4500	350
Benzo(b)/Benzo(k)fluoranthene	550	170	1500	42									
Benzo(g,h,i)perylene	310	70	490	380	99	400	360	370	370	350	350	*600*	350
Benzo(k)fluoranthene								130	530	440	350	4500	350
Benzyl alcohol	350	340	350	380	360	400	360						
bis(2-Chloroethoxy)methane	350	340	350	380	360	400	360	370	370	350	350	*340*	350
bis(2-Chloroethyl)ether	350	340	350	380	360	400	360	370	370	350	350	*340*	350
bis(2-Chloroisopropyl)ether (a)	350	340	350	380	360	400	360	370	370	350	350	*340*	350
bis(2-Ethylhexyl)phthalate	450	56	730	1000	360	400	360	370	370	350	350	2300	80
Butyl benzyl phthalate	350	340	47	380	360	400	360	370	370	350	350	*77*	350
Carbazole								370	370	75	350	*640*	350
Chrysene	720	370	1100	380	230	400	360	51	370	240	350	*2150*	350
Dibenzofuran	44	170	100	190	180	200	180	370	45	40	350	*310*	350
Dibenzo(a,h)anthracene	130	340	240	380	360	400	360	370	58	350	350	*430*	350
Diethyl phthalate	**175**	**170**	**175**	**190**	**180**	**200**	**180**	**185**	**185**	**175**	**175**	*170*	**175**
Dimethyl phthalate	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Di-n-butyl phthalate	5700	340	320	380	360	400	360	40	370	350	350	340	350
Di-n-octyl phthalate	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Fluoranthene	1300	320	2800	380	480	53	360	49	720	550	350	6700	350
Fluorene	85	170	160	190	60	200	180	370	370	75	350	570	350
Hexachloroben	350	340	350	380	360	400	360	370	370	350	350	*340*	350

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

								PHASE II					
TRC SAMPLE IDENTIFICATION:	TP-6-00-S	TP-7-00-S	TP-8-00-S	TP-9-00-S	B-09-01-00-S	B-09-02-00-S	B-09-03-00-S	09-SS01	09-SS02	09-SS03	09-SS04	09-SS05	09-SS06
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
												w/09-SS08	
Hexachlorobutadiene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Hexachlorocyclopentadiene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Hexachloroethane	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Indeno(1,2,3-cd)pyrene	300	75	450	380	85	400	360	370	160	160	350	*1300*	350
Isophorone	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Naphthalene	350	340	120	380	360	400	360	370	370	350	350	330	350
Nitrobenzene	350	340	350	380	360	400	360	370	370	350	350	*340*	350
N-Nitroso-di-n-propylamine	350	340	350	380	360	400	360	370	370	350	350	*340*	350
N-Nitrosodiphenylamine(1)	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Pentachlorophenol	52	**400**	**425**	**450**	**425**	**500**	**425**	**445**	**445**	**420**	**425**	***407.5***	**425**
Phenanthrene	960	150	2300	380	600	400	360	370	670	550	350	5900	350
Phenol	350	340	350	380	360	400	360	370	370	350	350	*340*	350
Pyrene	980	280	2100	380	490	45	360	57	540	510	350	5400	350
2,3,7,8-TCDD								0.22844	0.221513	0.207881	0.206815	0.20751	0.2021
								550405	550406	550407	550408		550410
PESTICIDES/PCBs (ug/kg)													
4,4'-DDD	17	16	17	18	17	20	17	8.2	1.5	0.8	1.9	4.7	3.5
4,4'-DDE	17	16	17	18	17	20	17	12	6.3	1.3	11	2.6	3.5
4,4'-DDT	17	16	17	18	17	20	17	48	28	6.3	29	*59.5*	3.5
Aldrin	8.6	8.2	8.6	9.2	8.7	9.8	8.7	1.9	1.9	1.8	1.8	1.8	1.8
Alpha chlordane	**43**	**41**	**43**	**46**	**43.5**	**49**	**43.5**	28	1.9	0.07	1.8	*1.5*	1.8
Alpha-BHC	**4.3**	**4.1**	**4.3**	**4.6**	**4.35**	**4.9**	**4.35**	0.084	**0.95**	**0.9**	**0.9**	**0.9**	**0.9**
Beta-BHC	11	8.2	8.6	9.2	21	9.8	8.7	1.9	1.9	1.8	1.8	*1.75*	1.8
Delta-BHC	**4.3**	**4.1**	**4.3**	**4.6**	**4.35**	**4.9**	**4.35**	**0.95**	**0.95**	**0.9**	**0.9**	**0.9**	**0.9**
Dieldrin	17	16	17	18	17	20	17	0.5	3.7	0.2	3.5	0.78	3.5
Endosulfan I	8.6	8.2	8.6	9.2	8.7	9.8	8.7	1.9	1.9	1.8	1.8	1.8	1.8
Endosulfan II	**8.5**	**8**	**8.5**	**9**	**8.5**	**10**	**8.5**	3.7	2.1	0.4	0.3	3.4	3.5
Endosulfan sulfate	17	16	17	18	17	20	17	3.3	3.7	3.5	3.5	*3.4*	3.5
Endrin	17	16	17	18	17	20	17	3.7	3.7	0.098	3.5	3.4	3.5
Endrin aldehyde								1.2	6.5	1.1	3.5	*3.4*	3.5
Endrin ketone	17	16	17	18	17	20	17	3.7	3.7	0.3	3.5	*3.4*	3.5
Gamma chlordane	**43**	**41**	**43**	**46**	**43.5**	**49**	**43.5**	23	1.9	0.19	1.8	5.6	1.8
Gamma-BHC (Lindane)	8.6	8.2	8.6	9.2	8.7	9.8	8.7	1.9	1.9	1.8	1.8	1.8	1.8
Heptachlor	8.6	8.2	8.6	9.2	8.7	9.8	8.7	1.9	1.9	1.8	1.8	1.8	1.8
Heptachlor epoxide	8.6	8.2	8.6	9.2	8.7	9.8	8.7	1.2	1.9	1.8	1.8	*1.06*	1.8
PCB-1016	86	82	86	92	87	98	87	37	37	35	35	*34*	35
PCB-1221	86	82	86	92	87	98	87	75	75	70	71	*69*	72
PCB-1232	86	82	86	92	87	98	87	37	37	35	35	*34*	35
PCB-1242	86	82	86	92	87	98	87	37	37	35	35	*34*	35
PCB-1248	86	82	86	92	87	98	87	37	37	35	35	*34*	35
PCB-1254	170	160	170	180	170	200	170	37	37	35	35	*34*	35
PCB-1260	260	160	240	180	170	200	170	37	78	35	35	780	35
p,p'-Methoxychlor	17	82	86	92	87	98	87	19	19	18	18	*17.5*	0.4
Toxaphene	170	160	170	180	170	200	170	190	190	180	180	*175*	180

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION:	09-SS07 Soil	09-B1-01 Soil	09-B2-01 Soil	09-B3-01 Soil	09-B4-01 Soil	09-B5-01 Soil	09-B6-01 Soil	09-B7-01 Soil	09-B8-01 Soil	09-MW5-01 Soil	09-MW6-01 Soil	09-MW8-01 Soil	09-MW9-01 Soil
						w/09-B10-01				w/09-MW1401			
	550418	552515	551412	552517	551267	551367	551358	551264	551409	554384	554672	552892	556048
INORGANICS (mg/kg)													
Aluminum	6460	23700	4950	6120	4750	*3420*	5320	2360	4850	*4955*	3280	3710	6290
Antimony	10	28.8	10.3	12	9.7	*9.95*	9.7	9.8	9.7	*15.5*	7.5	9.6	7.4
Arsenic	2.1	28.3	3.5	5.8	1.2	*2.05*	1.6	1.9	1.5	*5.35*	1.4	0.93	1.9
Barium	86.4	741	116	89.3	13.2	*9.65*	25.1	27.7	23.4	*102.95*	9.9	12.2	14.3
Beryllium	5.1	59.4	0.45	0.68	0.42	*0.435*	0.75	0.91	0.42	*7.6*	0.25	0.52	0.51
Cadmium	3.4	4.3	172	29.9	0.85	*0.0835*	1.7	0.4	4.3	*5.2*	0.12	0.4	0.16
Calcium	2170	15300	1080	2850	1120	*802*	574	466	3120	2710	823	402	735
Chromium	45.9	291	21.8	117	9.4	*6.2*	7.7	23.8	16.3	*44.4*	5.3	5.2	7.6
Cobalt	22.9	326	4.6	7.5	3	*3.1*	3.9	4.9	6	*50.35*	3.6	3	5.1
Copper	535	6620	194	245	10.4	*6.25*	49.4	71.1	63.3	*805*	6.4	12.2	16.1
Cyanide	0.55	0.52	0.56	0.55	0.52	*0.54*	0.53	0.53	0.53	*0.535*	0.52	0.52	0.52
Iron	27300	175000	13100	23200	10200	*8255*	12400	10200	9510	*28250*	7420	7040	11000
Lead	550	4320	399	325	34.9	*5.55*	71	241	86.8	*540*	5.3	30.3	21.2
Magnesium	1380	8200	1100	1830	899	*1255*	1250	1200	1340	*1380*	1140	765	1450
Manganese	303	1910	133	266	137	*76.35*	187	114	120	*289*	75.8	107	108
Mercury	0.2	0.1	0.48	0.15	0.1	*0.11*	0.11	0.11	0.1	*0.195*	0.1	0.1	0.1
Nickel	201	1540	53.3	34.5	6.5	*6.75*	8.7	19.7	11.8	*199.5*	4.7	6.4	5.9
Potassium	488	1910	503	497	773	*485*	473	572	506	*442.5*	296	465	390
Selenium	0.66	0.97	0.67	0.67	0.64	*0.65*	0.63	0.64	0.63	*0.645*	0.63	1.6	0.62
Silver	2.1	1.1	3.2	2.8	0.09	0.17	0.42	0.05	0.4	*0.505*	0.042	0.17	0.07
Sodium	373	4070	205	200	166	*153.5*	155	201	194	*570*	102	97.1	228
Thallium	0.87	0.84	0.9	0.89	0.84	*0.865*	0.85	0.86	0.84	*0.86*	0.84	0.83	0.83
Vanadium	16.4	42.5	112	41.4	7.6	*6.65*	9.2	6.9	19.4	*7.7*	5.3	8.8	10.1
Zinc	2600	32900	474	880	62	*21.35*	136	543	495	*4035*	46.2	46.3	76.7

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-SS07 Soil	09-B1-01 Soil	09-B2-01 Soil	09-B3-01 Soil	09-B4-01 Soil	09-B5-01 Soil	09-B6-01 Soil	09-B7-01 Soil	09-B8-01 Soil	09-MW5-01 Soil	09-MW6-01 Soil	09-MW8-01 Soil	09-MW9-01 Soil
						w/09-B10-01				w/09-MW1401			
	550418		551412		551267		551358	551264	551409				
VOLATILES (ug/kg)													
1,1-Dichloroethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
1,1-Dichloroethene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
1,1,1-Trichloroethane	4	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
1,1,2-Trichloroethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
1,1,2,2-Tetrachloroethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
1,2-Dichloroethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
1,2-Dichloroethene(Total)	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
1,2-Dichloropropane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
2-Butanone	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
2-Hexanone	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
4-Methyl-2-pentanone	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Acetone	13	11	45	11	11	*11*	11	11	11	18	10	20	14
Benzene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Bromodichloromethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Bromoform	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Bromomethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Carbon disulfide	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Carbon tetrachloride	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Chlorobenzene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Chloroethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Chloroform	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Chloromethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Cis-1,3-Dichloropropene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Dibromochloromethane	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Ethylbenzene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Methylene chloride	11	16	27	14	56	55	34	40	23	28	10	32	16
Styrene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Tetrachloroethene	11	12	1	11	11	*11*	11	11	11	1	10	10	10
Toluene	5.5	5.5	5.5	5.5	2	*5.5*	5.5	2	5.5	3	5	5	5
Trans-1,3-Dichloropropene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Trichloroethene	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Vinyl acetate													
Vinyl chloride	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10
Xylenes (Total)	11	11	11	11	11	*11*	11	11	11	*10.5*	10	10	10

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-SS07	09-B1-01	09-B2-01	09-B3-01	09-B4-01	09-B5-01	09-B6-01	09-B7-01	09-B8-01	09-MW5-01	09-MW6-01	09-MW8-01	09-MW9-01
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
						w/09-B10-01				w/09-MW1401			
	550404	552515	551412	552517	551267		551358	551264	551409		554672	552892	556048
SEMIVOLATILES (ug/kg)													
1,2-Dichlorobenzene	360		370	730	690	355	1000	3500	350	8750	340	340	340
1,2,4-Trichlorobenzene	360		370	365	345	355	500	1750	350	8750	340	340	340
1,3-Dichlorobenzene	360		370	730	690	355	1000	3500	350	8750	340	340	340
1,4-Dichlorobenzene	360		370	730	690	355	1000	3500	350	8750	340	340	340
2-Chloronaphthalene	360		370	730	690	355	1000	3500	350	8750	340	340	340
2-Chlorophenol	360		370	730	690	355	1000	3500	350	8750	340	340	340
2-Methylnaphthalene	46	1400	64	110	690	355	1000	4300	350	2050	340	340	340
2-Methylphenol	360		370	730	690	355	1000	3500	350	8750	340	340	340
2-Nitroaniline	870		890	1800	1700	860	2500	8500	840	21250	820	820	820
2-Nitrophenol	360		370	730	690	355	1000	3500	350	8750	340	340	340
2,4-Dichlorophenol	360		370	730	690	355	1000	3500	350	8750	340	340	340
2,4-Dimethylphenol	360		370	365	345	355	500	370	350	8750	340	340	340
2,4-Dinitrophenol	870		890	1800	1700	860	2500	8500	840	21250	820	820	820
2,4-Dinitrotoluene	360		370	730	690	355	1000	3500	350	8750	340	340	340
2,4,5-Trichlorophenol	870		890	1800	1700	860	2500	8500	840	21250	820	820	820
2,4,6-Trichlorophenol	360		370	730	690	355	1000	3500	350	8750	340	340	340
2,6-Dinitrotoluene	360		370	730	690	355	1000	3500	350	8750	340	340	340
3-Nitroaniline	870		890	1800	1700	860	2500	8500	840	21250	820	820	820
3,3'-Dichlorobenzidine	360		370	730	690	355	1000	3500	350	8750	340	340	340
4-Bromophenyl phenyl ether	360		370	730	690	355	1000	3500	350	8750	340	340	340
4-Chloro-3-methylphenol	360		370	730	690	355	1000	3500	350	8750	340	340	340
4-Chloroaniline	360		370	730	690	355	1000	3500	350	8750	340	340	340
4-Chlorophenyl phenyl ether	360		370	730	690	355	1000	3500	350	8750	340	340	340
4-Methylphenol	360		370	730	690	355	500	570	350	8750	340	340	340
4-Nitroaniline	870		890	1800	1700	860	2500	8500	840	21250	820	820	820
4-Nitrophenol	870		890	1800	1700	860	2500	8500	840	21250	820	820	820
4,6-Dinitro-2-methylphenol	870		890	1800	1700	860	2500	8500	840	21250	820	820	820
Acenaphthene	130	7400	150	2000	260	355	710	14000	190	10550	340	340	210
Acenaphthylene	150		50	730	690	355	1000	910	350	8750	340	340	340
Anthracene	390	16000	620	4000	470	355	960	21000	280	21500	340	340	340
Benzoic acid													
Benzo(a)anthracene	2300	42000	1400	13000	1100	355	2900	69000	820	59000	340	82	1200
Benzo(a)pyrene	1300	32000	960	11000	810	355	1800	45000	670	40000	340	71	890
Benzo(b)fluoranthene	3100	79000	2400	26000	1900	360	4200	110000	1400	82500	340	150	2000
Benzo(b)/Benzo(k)fluoranthene													
Benzo(g,h,i)perylene	810	11000	250	2400	540	355	860	9100	130	29000	340	340	250
Benzo(k)fluoranthene	3100	79000	2400	26000	1900	360	4200	110000	1400	82500	340	150	2000
Benzyl alcohol													
bis(2-Chloroethoxy)methane	360		370	730	690	355	1000	3500	350	8750	340	340	340
bis(2-Chloroethyl)ether	360		370	730	690	355	1000	3500	350	8750	340	340	340
bis(2-Chloroisopropyl)ether (a)	360		370	730	690	355	1000	3500	350	8750	340	340	340
bis(2-Ethylhexyl)phthalate	360		190	400	190	72	270	3500	640	8750	340	660	340
Butyl benzyl phthalate	360		370	330	345	355	500	1750	350	8750	340	34	340
Carbazole	150	11000	200	2700	360	355	680	18000	240	13500	340	340	340
Chrysene	860	39000	1200	12000	1000	355	2700	63000	740	46000	340	69	1100
Dibenzofuran	70	4300	170	770	220	355	240	8400	69	6050	340	340	85
Dibenzo(a,h)anthracene	400		98	6500	200	355	350	4200	64	6450	340	340	80
Diethyl phthalate	180		185	365	345	177.5	500	1750	175	8750	170	170	170
Dimethyl phthalate	360		370	730	690	355	1000	3500	350	8750	340	340	340
Di-n-butyl phthalate	49		55	730	690	355	1000	3500	350	8750	340	340	340
Di-n-octyl phthalate	360		370	730	690	355	1000	3500	350	8750	340	340	340
Fluoranthene	2500	100000	3600	33000	2500	360	5100	140000	1800	115000	340	120	3300
Fluorene	120		320	1800	300	355	550	15000	130	11500	340	340	[illegible]
Hexachloroben[illegible]	360		370	730	690	355	1000	3500	350	8750	340	340	[illegible]

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-SS07 Soil	09-B1-01 Soil	09-B2-01 Soil	09-B3-01 Soil	09-B4-01 Soil	09-B5-01 Soil	09-B6-01 Soil	09-B7-01 Soil	09-B8-01 Soil	09-MW5-01 Soil	09-MW6-01 Soil	09-MW8-01 Soil	09-MW9-01 Soil
						w/09-B10-01				w/09-MW1401			
Hexachlorobutadiene	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
Hexachlorocyclopentadiene	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
Hexachloroethane	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
Indeno(1,2,3-cd)pyrene	1200	11000	300	2400	540	*355*	920	14000	220	*23500*	340	340	260
Isophorone	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
Naphthalene	360	3200	57	200	150	*355*	160	9300	45	*4500*	340	340	340
Nitrobenzene	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
N-Nitroso-di-n-propylamine	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
N-Nitrosodiphenylamine(1)	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
Pentachlorophenol	**435**		**445**	**900**	**850**	***430***	**1250**	**4250**	**420**	***21250***	**410**	**410**	**410**
Phenanthrene	1000	79000	2600	20000	2700	*360*	4200	130000	1200	*98500*	340	52	2300
Phenol	360		370	730	690	*355*	1000	3500	350	***8750***	340	340	340
Pyrene	1800	66000	1700	21000	1800	*360*	4200	120000	1100	*100000*	340	97	2200
2,3,7,8-TCDD													
	550404 D50	552515 D51	551412	552517 D11	551267 D50		551358	551264 D50	551409 D50		554672	552892	556048
PESTICIDES/PCBs (ug/kg)													
4,4'-DDD	6.5	52	10	36	2.2	2.8	95	81	3.2	9.9	2.2	3.4	1.4
4,4'-DDE	3.4	14	9.6	9	1.3	2.8	16	3	3	*18*	8.9	0.23	3.4
4,4'-DDT	50	39	3.7	36	22	7	1.6	18	17	*33*	15	3.4	3.4
Aldrin	9.3	90	1.9	19	0.79	*1.8*	1.8		8.9	*9.1*	1.8	1.8	1.7
Alpha chlordane	5.5	13	6.8	24	8.9	*1.8*	1.8	15	8.9	8.9	1.8	0.22	1.2
Alpha-BHC	**4.65**	45	**0.95**	**9.5**	**4.45**	***0.9***	**0.9**	**4.5**	**4.45**	***4.55***	**0.9**	**0.9**	0.098
Beta-BHC	9.3	90	1	19	8.9	*1.8*	1.8	9	8.9	*9.1*	1.8	1.8	1.7
Delta-BHC	**4.65**	45	**0.95**	**9.5**	**4.45**	***0.9***	**0.9**	0.76	**4.45**	***4.55***	**0.9**	**0.9**	**0.85**
Dieldrin	18	54	2.6	8.4	1.2	*3.6*	0.8	36	17	22	3.4	0.28	1
Endosulfan I	9.3	90	1.9	19	6.5	*1.8*	1.8	9	8.9	*11.15*	1.8	1.8	1.7
Endosulfan II	4.2	85	3.7	18	8.5	*3.6*	3.5	7.4	8.5	*8.75*	3.4	3.4	3.4
Endosulfan sulfate	18	33	3.7	8.7	1.3	0.62	1.4	18	17	9.7	3.4	3.4	3.4
Endrin	18	85	3.7	36	0.53	0.2	6.2	24	17	*16*	0.13	3.4	3.4
Endrin aldehyde	18	85	3.7	36	8.8	0.45	0.51	110	17	1	3.4	3.4	3.4
Endrin ketone	18	85	3.7	16	2.8	*3.6*	5.1	57	17	*17.5*	3.4	3.4	3.4
Gamma chlordane	5.5	13	9.9	5	0.61	*1.8*	1	8.7	8.9	8.9	1.8	0.63	1.7
Gamma-BHC (Lindane)	9.3	45	1.9	19	8.9	*1.8*	1.8		8.9	*9.1*	1.8	1.8	1.7
Heptachlor	9.3	45	1.9	19	8.9	*1.8*	1.8		8.9	*9.1*	0.091	1.8	0.67
Heptachlor epoxide	9.3	29	1.9	10	8.9	*1.8*	0.45	9	8.9	*9.1*	1.8	1.8	1.7
PCB-1016	180	1700	37	360	170	*36*	35	180	170	*175*	34	34	34
PCB-1221	370	3500	75	730	350	*73*	70	360	350	*360*	70	70	69
PCB-1232	180	1700	37	360	170	*36*	35	180	170	*175*	34	34	34
PCB-1242	180	1700	37	360	170	*36*	35	180	170	*175*	34	34	34
PCB-1248	180	1700	37	360	170	*36*	35	180	170	*175*	34	34	34
PCB-1254	180	1700	37	360	170	*36*	35	180	170	*175*	34	34	34
PCB-1260	970	1700	260	360	170	*36*	35	180	680	170	34	17	34
p,p'-Methoxychlor	9.3	**450**	24	190	9.9	*18*	18	630	89	41	18	18	17
Toxaphene	930	9000	190	1900	890	*180*	180	900	890	*910*	180	180	170

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-MW10-01 Soil	09-MW1101 Soil	09-MW12-01 Soil	09-MW1301 Soil
	551558	554674	569327	559392
INORGANICS (mg/kg)				
Aluminum	6320	9710	5740	9400
Antimony	9.6	37.5	7.5	12.1
Arsenic	2	9.5	2	1.5
Barium	50.2	321	8.3	8.8
Beryllium	1.3	1.8	0.34	0.53
Cadmium	1.8	132	0.031	0.09
Calcium	1860	3710	350	212
Chromium	14.8	99	5.4	6.9
Cobalt	11.5	51	3.5	2.4
Copper	149	1150	9.4	6.6
Cyanide	0.52	0.59	0.54	0.66
Iron	14800	185000	9480	9270
Lead	165	898	6.2	9.2
Magnesium	2090	1680	988	602
Manganese	220	1470	72.9	22.6
Mercury	0.1	2.8	0.11	0.13
Nickel	65.6	104	7.3	8.2
Potassium	674	790	273	590
Selenium	0.62	0.68		
Silver	0.51	14.6	0.055	0.23
Sodium	239	433	45.6	53.2
Thallium	0.83	0.91	0.65	1
Vanadium	11.7	64.4	6.9	11.3
Zinc	787	3570	22.4	14.4

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-MW10-01 Soil	09-MW1101 Soil	09-MW12-01 Soil	09-MW1301 Soil
VOLATILES (ug/kg)				
1,1-Dichloroethane	10	11	11	13
1,1-Dichloroethene	10	11	11	13
1,1,1-Trichloroethane	10	11	11	13
1,1,2-Trichloroethane	10	11	11	13
1,1,2,2-Tetrachloroethane	10	11	11	13
1,2-Dichloroethane	10	11	11	13
1,2-Dichloroethene(Total)	10	11	11	13
1,2-Dichloropropane	10	11	11	13
2-Butanone	10	11	11	13
2-Hexanone	10	11	11	13
4-Methyl-2-pentanone	10	11	11	13
Acetone	25	11	64	13
Benzene	10	11	11	13
Bromodichloromethane	10	11	11	13
Bromoform	10	11	11	13
Bromomethane	10	11	11	13
Carbon disulfide	10	11	11	13
Carbon tetrachloride	10	11	11	13
Chlorobenzene	10	11	11	13
Chloroethane	10	11	11	13
Chloroform	10	11	11	13
Chloromethane	10	11	11	13
Cis-1,3-Dichloropropene	10	11	11	13
Dibromochloromethane	10	11	11	13
Ethylbenzene	10	11	11	13
Methylene chloride	31	11	31	19
Styrene	10	11	11	13
Tetrachloroethene	10	11	11	13
Toluene	5	5.5	5.5	6.5
Trans-1,3-Dichloropropene	10	11	11	13
Trichloroethene	10	11	11	13
Vinyl acetate				
Vinyl chloride	10	11	11	13
Xylenes (Total)	10	11	11	13

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-MW10-01 Soil	09-MW1101 Soil	09-MW12-01 Soil	09-MW1301 Soil
	551558	554674	569327	559392
SEMIVOLATILES (ug/kg)				
1,2-Dichlorobenzene	340	370	350	430
1,2,4-Trichlorobenzene	340	240	350	430
1,3-Dichlorobenzene	340	370	350	430
1,4-Dichlorobenzene	340	370	350	430
2-Chloronaphthalene	340	370	350	430
2-Chlorophenol	340	370	350	430
2-Methylnaphthalene	340	370	350	430
2-Methylphenol	340	370	350	430
2-Nitroaniline	830	900	850	1000
2-Nitrophenol	340	370	350	430
2,4-Dichlorophenol	340	370	350	430
2,4-Dimethylphenol	340	370	350	430
2,4-Dinitrophenol	830	900	850	1000
2,4-Dinitrotoluene	340	370	350	430
2,4,5-Trichlorophenol	830	900	850	1000
2,4,6-Trichlorophenol	340	370	350	430
2,6-Dinitrotoluene	340	370	350	430
3-Nitroaniline	830	900	850	1000
3,3'-Dichlorobenzidine	340	370	350	430
4-Bromophenyl phenyl ether	340	370	350	430
4-Chloro-3-methylphenol	340	370	350	430
4-Chloroaniline	340	370	350	430
4-Chlorophenyl phenyl ether	340	370	350	430
4-Methylphenol	340	370	350	430
4-Nitroaniline	830	900	850	1000
4-Nitrophenol	830	900	850	1000
4,6-Dinitro-2-methylphenol	830	900	850	1000
Acenaphthene	210	43	350	430
Acenaphthylene	340	370	350	430
Anthracene	320	91	350	430
Benzoic acid				
Benzo(a)anthracene	1300	720	350	430
Benzo(a)pyrene	930	530	350	430
Benzo(b)fluoranthene	2100	1200	350	430
Benzo(b)/Benzo(k)fluoranthene				
Benzo(g,h,i)perylene	440	780	350	430
Benzo(k)fluoranthene	2100	1200	350	430
Benzyl alcohol				
bis(2-Chloroethoxy)methane	340	370	350	430
bis(2-Chloroethyl)ether	340	370	350	430
bis(2-Chloroisopropyl)ether (a)	340	370	350	430
bis(2-Ethylhexyl)phthalate	520	1900	350	430
Butyl benzyl phthalate	52	370	350	430
Carbazole	270	85	350	430
Chrysene	1100	480	350	430
Dibenzofuran	92	370	350	430
Dibenzo(a,h)anthracene	160	200	350	430
Diethyl phthalate	**170**	64	**175**	**215**
Dimethyl phthalate	340	370	350	430
Di-n-butyl phthalate	46	78	350	430
Di-n-octyl phthalate	340	370	350	430
Fluoranthene	2400	930	350	430
Fluorene	200	39	350	430
Hexachlorobe[illegible]	340	370	350	430

TABLE C-1
SURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-MW10-01 Soil	09-MW1101 Soil	09-MW12-01 Soil	09-MW1301 Soil
Hexachlorobutadiene	340	370	350	430
Hexachlorocyclopentadiene	340	370	350	430
Hexachloroethane	340	370	350	430
Indeno(1,2,3-cd)pyrene	430	670	350	430
Isophorone	340	370	350	430
Naphthalene	57	55	350	430
Nitrobenzene	340	370	350	430
N-Nitroso-di-n-propylamine	340	370	350	430
N-Nitrosodiphenylamine(1)	340	370	350	430
Pentachlorophenol	415	98	425	500
Phenanthrene	1600	430	350	430
Phenol	340	370	350	430
Pyrene	1700	640	350	430
2,3,7,8-TCDD				
	551558	554674 D22	569327	559392
PESTICIDES/PCBs (ug/kg)				
4,4'-DDD	8.1	375	3.5	4.3
4,4'-DDE	2.4	375	3.5	0.45
4,4'-DDT	11	375	3.5	0.43
Aldrin	1.8	190	1.8	2.2
Alpha chlordane	12	190	1.8	2.2
Alpha-BHC	0.9	190	0.9	1.1
Beta-BHC	1.8	190	1.8	2.2
Delta-BHC	0.9	190	0.9	1.1
Dieldrin	3.4	375	3.5	4.3
Endosulfan I	1.8	190	1.8	2.2
Endosulfan II	0.17	375	3.5	4.3
Endosulfan sulfate	3.4	375	3.5	4.3
Endrin	0.43	375	3.5	4.3
Endrin aldehyde	3.9	375	3.5	0.84
Endrin ketone	3.4	375	3.5	4.3
Gamma chlordane	14	190	1.8	0.25
Gamma-BHC (Lindane)	1.8	190	1.8	2.2
Heptachlor	1.4	190	1.8	0.11
Heptachlor epoxide	1.3	190	1.8	2.2
PCB-1016	34	3750	35	43
PCB-1221	70	7500	72	87
PCB-1232	34	3750	35	43
PCB-1242	34	3750	35	43
PCB-1248	34	3750	35	43
PCB-1254	34	3750	35	43
PCB-1260	34	30000	35	43
p,p'-Methoxychlor	14	1900	18	22
Toxaphene	180	19000	180	220

C-1
SURFACE SOIL DATA
(BACKGROUND)
NCBC – DAVISVILLE

CLIENT ID:	BK-SS01	BK-SS02	BK-SS06	BK-SS07	BK-SS09	BK-SS11	BK-SS17
LABORATORY ID:	36061-014	36061-015	36096-018	36096-019	36096-021	550412	550416
ANALYTE (mg/Kg)							
Aluminum	1710	1170	8560	5620	2940	6280	7000
Antimony	2.2	1.8	2.9	2	2.5	10.4	13.7
Arsenic	0.9	0.59	1.3	0.95	1.1	5.5	8.1
Barium	5.6	13.1	6.5	10.2	8.2	14.9	15.5
Beryllium	0.16	0.12	0.36	0.39	0.33	0.66	0.6
Cadmium	0.32	0.46	0.42	0.3	0.36	0.28	0.03
Calcium	628	218	62.7	216	167	510	337
Chromium	3.6	9.6	6.1	5.7	3.5	8.1	7.7
Cobalt	1.7	1.1	1.9	4.6	2.7	3.8	2.7
Copper	4.7	6.2	3.9	9.9	8.8	15	10.2
Iron	4540	3810	11500	10200	5960	9460	12000
Lead	3.4	53.8	13.1	11.7	13.8	50.3	22.6
Magnesium	617	325	387	1190	636	1220	1070
Manganese	34.4	36.2	21.8	118	82.8	150	53.6
Mercury	0.04	0.06	0.03	0.04	0.06	0.11	0.15
Nickel	4.3	4	1.9	5	2.3	7	9.2
Potassium	228	207	145	451	304	510	728
Selenium	0.16	0.13	0.77	0.34	0.24	0.68	0.9
Silver	0.51	0.44	0.68	0.48	0.58	0.08	0.06
Sodium	17.1	15.5	19.5	13.8	15.3	92.6	119
Thallium	0.12	0.1	0.12	0.11	0.12	0.9	1.2
Vanadium	3.8	3.3	14.2	10.7	7.8	12	24.6
Zinc	12	172	10.3	22.7	18.3	30	16.6
Cyanide	0.19	0.16	0.19	0.17	0.17	0.56	0.75

Unshaded = Non-detect
Shaded = detect

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	PHASE I B-09-02-02-S Soil	B-09-03-04-S Soil	TP-1-06-S Soil	TP-2-08-S Soil	TP-3-06-S Soil	TP-5-06-S Soil	TP-6-02-S Soil	TP-7-06-S Soil	TP-8-06-S Soil	TP-9-08-S Soil	PHASE II 09-B2-03 Soil	09-B3-03 Soil	09-B4-05 Soil
											551418	552576	551273
INORGANICS (mg/kg)													
Aluminum	5480	3200	4190	5750	10200	6760	5240	6330	7670	5150	3060	6330	6730
Antimony	5.8	6.2	12.2	14.8	12.5	20.4	11.7	11.6	39.7	11.1	11.7	11	10.6
Arsenic	1.4	1.5	2.7	2.1	6.7	4.2	1.8	1.5	7.3	2.9	2.4	2.5	9.7
Barium	9.8	5.1	17.7	154	679	133	62.1	40.6	163	189	9.1	39.3	26.7
Beryllium	0.22	0.23	1.2	2.1	1.7	1.1	4.3	1.7	2.5	1.4	0.51	0.48	0.46
Cadmium	1.1	1.2	1.1	1.3	19.5	29	2.5	1	29.8	6.3	0.31	6.4	9.1
Calcium	201	329	672	1780	12200	4970	2240	1410	9770	3460	347	3240	1090
Chromium	3.4	4.2	4.3	7.4	45.4	40.2	37.7	16.7	81	17	4.2	20.8	16.5
Cobalt	4.7	5.1	13.6	3.9	14.4	11.1	20.5	7.5	26.3	6.7	2.6	5.6	4.2
Copper	10.3	10.6	14.4	11.9	670	301	950	89.4	2750	67.4	7.4	76.5	17.5
Cyanide	0.55	0.59	0.61	0.76	0.62	0.59	0.59	0.58	0.61	0.57	0.63	0.59	0.57
Iron	11700	7600	13000	10200	31600	24200	19100	10900	50000	23700	8920	14200	12800
Lead	7.9	3.5	79.7	293	765	359	480	93.9	1440	148	9.9	89.6	34.3
Magnesium	1310	907	1610	1020	2640	1600	1280	711	2050	1380	1190	1790	1170
Manganese	107	149	402	66.7	511	301	257	82.8	514	178	72	149	97.7
Mercury	0.16	0.12	0.11	0.13	0.56	0.76	0.3	0.1	0.92	0.11	0.13	0.12	0.14
Nickel	8.2	10.7	10.7	10.5	62.4	43.1	227	32.7	205	21.3	7.9	11.5	10.1
Potassium	199	136	825	594	705	590	470	468	489	445	569	547	879
Selenium	0.42	0.46	3.9	4.8	3.9	3.8	3.8	1.8	1.9	1.8	0.76	0.71	0.69
Silver	0.65	0.69	1.4	8.2	3.1	5	2.4	1.3	9.5	3.4	0.2	0.62	0.15
Sodium	318	217	454	550	461	446	435	433	453	412	158	122	198
Thallium	0.42	0.46	0.32	0.39	0.31	0.31	0.31	0.3	0.69	0.51	1	0.95	0.92
Vanadium	14.2	4.2	11.9	12.7	26.8	91.9	29.5	14.6	102	31.9	19.2	12.6	9.6
Zinc	34.9	28.9	27.3	53.8	1990	946	2130	510	1430	318	19.5	229	104

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION:	PHASE I B-09-02-02-S Soil	B-09-03-04-S Soil	TP-1-06-S Soil	TP-2-08-S Soil	TP-3-08-S Soil	TP-5-06-S Soil	TP-6-02-S Soil	TP-7-06-S Soil	TP-8-06-S Soil	TP-9-08-S Soil	PHASE II 09-B2-03 Soil	09-B3-03 Soil	09-B4-05 Soil
											551413	552575	551268
VOLATILES (ug/kg)													
1,1-Dichloroethane	5	6	7	8	6	6	370000	5	6	6	13	12	11
1,1-Dichloroethene	5	6	7	8	6	6	370000	5	6	6	13	12	11
1,1,1-Trichloroethane	2.5	3	3.5	4	3	3	370000	2.5	3	3	6.5	6	5.5
1,1,2-Trichloroethane	5	6	7	8	6	6	370000	5	6	6	13	12	11
1,1,2,2-Tetrachloroethane	5	6	7	8	6	6	370000	5	6	6	13	12	11
1,2-Dichloroethane	5	6	7	8	6	6	370000	5	6	6	13	12	11
1,2-Dichloroethene(Total)	5	6	7	8	6	6	370000	5	6	6	13	12	11
1,2-Dichloropropane	5	6	7	8	6	6	370000	5	6	6	13	12	11
2-Butanone	11	12	13	6	12	12	180000	10	12	11	13	12	11
2-Hexanone	11	12	13	15	12	12	750000	10	12	11	13	12	11
4-Methyl-2-pentanone	11	12	13	15	12	12	750000	10	12	11	13	12	11
Acetone	18	21	23	74	21	29	59000	8	36	16	130	34	77
Benzene	5	6	7	32	6	6	1500	5	6	6	13	12	11
Bromodichloromethane	5	6	7	8	6	6	370000	5	6	6	13	12	11
Bromoform	5	6	7	8	6	6	370000	5	6	6	13	12	11
Bromomethane	11	12	13	15	12	12	750000	10	12	11	13	12	11
Carbon disulfide	5	6	7	8	6	6	370000	5	6	6	13	12	11
Carbon tetrachloride	5	6	7	8	6	6	370000	5	6	6	13	12	11
Chlorobenzene	5	6	7	8	6	6	370000	5	6	6	13	12	2
Chloroethane	11	12	13	15	12	12	750000	10	12	11	13	12	11
Chloroform	2.5	2.5	3.5	2.5	2	3	370000	2.5	3	2	6.5	6	5.5
Chloromethane	11	12	13	15	12	12	750000	10	12	11	13	12	11
Cis-1,3-Dichloropropene	5	6	7	8	6	6	370000	5	6	6	13	12	11
Dibromochloromethane	5	6	7	8	6	6	370000	5	6	6	13	12	11
Ethylbenzene	5	6	7	6	6	6	910000	5	3	6	13	12	2
Methylene chloride	15	67	23	40	46	18	56000	13	12	12	39	19	22
Styrene	5	6	7	8	6	6	370000	5	6	6	13	12	11
Tetrachloroethene	5	6	7	8	6	6	370000	5	6	6	13	12	11
Toluene	5	6	7	2	6	2	15000000	5	2	6	13	12	11
Trans-1,3-Dichloropropene	5	6	7	8	6	6	370000	5	6	6	13	12	11
Trichloroethene	5	6	7	8	2	6	3800	5	1	6	13	12	11
Vinyl acetate	11	12	13	15	12	12	750000	10	12	11			
Vinyl chloride	11	12	13	15	12	12	750000	10	12	11	13	12	11
Xylenes (Total)	5	6	7	40	6	2	4200000	5	70	6	13	1	5

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

	PHASE I										PHASE II		
TRC SAMPLE IDENTIFICATION:	B-09-02-02-S Soil	B-09-03-04-S Soil	TP-1-06-S Soil	TP-2-08-S Soil	TP-3-06-S Soil	TP-5-06-S Soil	TP-6-02-S Soil	TP-7-06-S Soil	TP-8-06-S Soil	TP-9-08-S Soil	09-B2-03 Soil	09-B3-03 Soil	09-B4-05 Soil
											551413	552575	551268
SEMIVOLATILES (ug/kg)													
1,2-Dichlorobenzene	360	390	440	510	410	390	4300	780	380	370	410	390	1100
1,2,4-Trichlorobenzene	180	195	220	255	410	46	3950	390	190	185	205	195	550
1,3-Dichlorobenzene	360	390	440	510	410	390	3950	780	380	370	410	390	1100
1,4-Dichlorobenzene	360	390	440	510	410	73	840	780	380	370	410	390	1100
2-Chloronaphthalene	360	390	440	510	410	390	3950	780	380	370	410	390	1100
2-Chlorophenol	360	390	440	510	410	390	3950	780	380	370	410	390	1100
2-Methylnaphthalene	360	390	440	890	410	260	240	780	190	220	410	2700	1100
2-Methylphenol	180	195	220	255	410	195	3950	390	190	185	205	195	550
2-Nitroaniline	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800	1000	950	2700
2-Nitrophenol	360	390	440	510	410	390	3950	780	380	370	410	390	1100
2,4-Dichlorophenol	360	390	440	510	410	390	3950	780	380	370	410	390	1100
2,4-Dimethylphenol	360	390	440	510	410	390	3950	780	380	370	410	390	1100
2,4-Dinitrophenol	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800	1000	950	2700
2,4-Dinitrotoluene	360	390	440	510	410	390	3950	780	380	370	410	390	1100
2,4,5-Trichlorophenol	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800	1000	950	2700
2,4,6-Trichlorophenol	360	390	440	510	410	390	3950	780	380	370	410	390	1100
2,6-Dinitrotoluene	360	390	440	510	410	390	3950	780	380	370	410	390	1100
3-Nitroaniline	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800	1000	950	2700
3,3'-Dichlorobenzidine	730	790	880	1000	820	790	8000	1600	770	740	410	390	1100
4-Bromophenyl phenyl ether	360	390	440	510	410	390	3950	780	380	370	410	390	1100
4-Chloro-3-methylphenol	360	390	440	510	410	390	3950	780	380	370	410	390	1100
4-Chloroaniline	360	390	440	510	410	390	3950	780	380	370	410	390	1100
4-Chlorophenyl phenyl ether	360	390	440	510	410	390	3950	780	380	370	410	390	1100
4-Methylphenol	180	195	220	255	205	195	280	390	190	185	205	195	550
4-Nitroaniline	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800	1000	950	2700
4-Nitrophenol	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800	1000	950	2700
4,6-Dinitro-2-methylphenol	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800	1000	950	2700
Acenaphthene	360	390	440	370	410	240	980	440	65	180	410	150	130
Acenaphthylene	180	195	220	255	205	180	3800	215	190	47	205	195	550
Anthracene	360	390	440	270	410	240	1900	890	130	490	410	200	230
Benzoic acid	1800	1900	2100	2500	2000	1900	19000	3800	1900	1800			
Benzo(a)anthracene	170	390	440	1100	210	830	5600	4100	1100	2100	410	690	580
Benzo(a)pyrene	130	390	440	950	210	890	5000	3100	1400	1500	410	470	450
Benzo(b)fluoranthene	140	390									410	970	940
Benzo(b)/Benzo(k)fluoroanthene			440	1500	390	900	9500	3100	1900	3000			
Benzo(g,h,i)perylene	41	390	440	360	99	390	1300	1500	750	670	410	280	1100
Benzo(k)fluoranthene	92										410	970	940
Benzyl alcohol	360	390	440	510	410	390	3950	780	380	370			
bis(2-Chloroethoxy)methane	360	390	440	510	410	390	3950	780	380	370	410	390	1100
bis(2-Chloroethyl)ether	360	390	440	510	410	390	3950	330	380	370	410	390	1100
bis(2-Chloroisopropyl)ether (a)	180	195	220	255	205	195	3950	390	190	185	205	195	550
bis(2-Ethylhexyl)phthalate	72	390	440	490	64	4100	33000	230	5400	550	410	680	10000
Butyl benzyl phthalate	360	390	440	510	410	390	8300	780	390	370	410	200	290
Carbazole											410	130	1100
Chrysene	160	390	440	1200	240	1000	7000	4100	1100	2200	410	500	530
Dibenzofuran	360	390	440	530	410	110	620	210	380	92	410	95	1100
Dibenzo(a,h)anthracene	360	390	440	270	410	160	360	610	460	420	410	90	1100
Diethyl phthalate	180	195	220	255	205	43	3800	390	190	185	205	195	550
Dimethyl phthalate	360	390	440	510	410	390	3950	780	380	370	410	390	1100
Di-n-butyl phthalate	360	390	440	510	410	56	1300	780	61	370	52	390	1100
Di-n-octyl phthalate	360	390	440	510	410	390	3950	780	380	370	410	390	1100
Fluoranthene	170	390	440	2000	410	1600	17000	7700	1900	3200	410	1500	1000
Fluorene	360	390	440	660	410	230	860	480	65	210	410	160	160
Hexachlorobenzene	360	390	440	510	410	390	3950	780	380	370	410	390	1100

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

	PHASE I										PHASE II		
TRC SAMPLE IDENTIFICATION:	B-09-02-02-S	B-09-03-04-S	TP-1-06-S	TP-2-08-S	TP-3-06-S	TP-5-06-S	TP-6-02-S	TP-7-06-S	TP-8-06-S	TP-9-08-S	09-B2-03	09-B3-03	09-B4-05
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Hexachlorobutadiene	360	390	440	510	410	390	**3950**	780	380	370	410	390	1100
Hexachlorocyclopentadiene	360	390	440	510	410	390	**3950**	780	380	370	410	390	1100
Hexachloroethane	360	390	440	510	410	390	**3950**	780	380	370	410	390	1100
Indeno(1,2,3-cd)pyrene	47	390	440	380	89	370	1300	1500	710	650	410	340	1100
Isophorone	360	390	440	510	410	390	**3950**	780	380	370	410	390	1100
Naphthalene	360	390	440	980	410	450	1100	97	230	140	410	860	150
Nitrobenzene	360	390	440	510	410	390	**3950**	780	380	370	410	390	1100
N-Nitroso-di-n-propylamine	360	390	440	510	410	390	**3950**	780	380	370	410	390	1100
N-Nitrosodiphenylamine(1)	**180**	**195**	**220**	**255**	**205**	**195**	**3950**	**390**	**190**	**185**	**205**	**195**	120
Pentachlorophenol	1800	1900	2100	2500	2000	1900	**19000**	3800	1900	1800	1000	950	2700
Phenanthrene	78	390	440	1800	280	1100	11000	4400	920	2500	410	850	900
Phenol	360	390	440	510	410	390	77000	330	380	370	410	390	1100
Pyrene	160	390	440	1900	320	1400	9900	5200	2000	2700	410	850	820
											551413	552575 D20	551268
PESTICIDES/PCBs (ug/kg)													
4,4'-DDD	18	19	21	16	20	38	110	16	19	18	4.2	17	9.2
4,4'-DDE	18	19	21	16	20	38	66	16	19	18	4.2	890	2.5
4,4'-DDT	18	19	21	16	20	38	19	16	19	18	4.2	17	5.7
Aldrin	**4.4**	**4.75**	**5.5**	**4**	**4.95**	**9.5**	**4.75**	**4**	**4.65**	**4.5**	2.1	3.8	2
Alpha chlordane	**44**	**47.5**	**55**	**40**	**49.5**	**95**	**47.5**	**40**	**46.5**	**45**	2.1	13	2.2
Alpha-BHC	**4.4**	**4.75**	**5.5**	**4**	**4.95**	**9.5**	**4.75**	**4**	**4.65**	**4.5**	**1.05**	0.98	**1**
Beta-BHC	8.8	9.5	11	8	9.9	42	9.5	8	9.3	9	2.1	3.8	2
Delta-BHC	**4.4**	**4.75**	**5.5**	**4**	**4.95**	**9.5**	**4.75**	**4**	**4.65**	**4.5**	**1.05**	**1.9**	0.063
Dieldrin	**9**	**9.5**	**10.5**	**8**	**10**	**19**	**9.5**	**8**	**9.5**	**9**	**2.1**	**3.75**	0.36
Endosulfan I	**4.4**	**4.75**	**5.5**	**4**	**4.95**	**9.5**	**4.75**	**4**	**4.65**	**4.5**	2.1	1.9	2
Endosulfan II	18	19	21	16	20	38	19	16	19	18	4.2	7.5	0.4
Endosulfan sulfate	18	19	21	16	20	38	19	16	19	18	4.2	7.5	3.8
Endrin	**9**	**9.5**	**10.5**	**8**	**10**	**19**	**9.5**	**8**	**9.5**	**9**	**2.1**	**3.75**	1.4
Endrin aldehyde											4.2	7.5	3.8
Endrin ketone	**9**	**9.5**	**10.5**	**8**	**10**	**19**	**9.5**	**8**	**9.5**	**9**	**2.1**	**3.75**	3.5
Gamma chlordane	**44**	**47.5**	**55**	**40**	**49.5**	**95**	**47.5**	**40**	**46.5**	**45**	2.1	0.85	1.7
Gamma-BHC (Lindane)	8.8	9.5	11	8	9.9	19	9.5	8	9.3	9	2.1	3.8	2
Heptachlor	**4.4**	**4.75**	**5.5**	**4**	**4.95**	**9.5**	**4.75**	**4**	**4.65**	**4.5**	**1.05**	**1.9**	**1**
Heptachlor epoxide	**4.4**	**4.75**	**5.5**	**4**	**4.95**	**9.5**	**4.75**	**4**	**4.65**	**4.5**	2.1	**1.9**	2
PCB-1016	88	95	110	80	99	190	95	80	93	90	42	75	38
PCB-1221	88	95	110	80	99	190	95	80	93	90	84	150	77
PCB-1232	88	95	110	80	99	190	95	80	93	90	42	75	38
PCB-1242	88	95	110	80	99	190	95	80	93	90	42	75	38
PCB-1248	88	95	110	80	99	190	95	80	93	90	42	75	38
PCB-1254	180	190	210	160	200	**190**	190	160	190	290	42	75	38
PCB-1260	180	190	210	160	200	1100	800	160	590	180	42	75	38
p,p'-Methoxychlor	**44**	**47.5**	**55**	**40**	**49.5**	**95**	**47.5**	**40**	**46.5**	**45**	**10.5**	**19**	**10**
Toxaphene	180	190	210	160	200	380	190	160	190	180	210	380	200

Bolded : 1/2 SQL
Shaded : Detected value
Italicised : Data averaged with duplicate
Dark shaded : Rejected data
(a) Reported as bis(2-chloroisopropyl)ether in Phase I and as 2,2'-oxybis(1-chloropropane) in Phase II

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-B7-04 Soil	09-B8-04 Soil	09-MW5-04 Soil	09-MW7-02 Soil	09-MW8-04 Soil	09-MW1105 Soil	09-MW12-03 Soil
	551270	551415	554397	552533	552897	554677	569346
INORGANICS (mg/kg)							
Aluminum	11300	3310	6240	5610	18300	7600	3500
Antimony	33.4	11.3	8	9.8	89.8	8.4	9.2
Arsenic	7.3	4.6	4.6	0.87	13.6	2.2	1.6
Barium	248	25	81.9	106	582	47	5.2
Beryllium	0.89	0.84	3.6	5.6	2.9	1.5	0.3
Cadmium	14.5	6.6	7.2	0.28	56.3	23	0.026
Calcium	12700	1590	21500	3070	7710	4600	421
Chromium	49.4	20.5	24.9	79.8	154	21.7	4.7
Cobalt	15	7.4	21.4	26.4	22.6	8.7	2.5
Copper	232	84.9	333	736	1130	413	8.5
Cyanide	0.61	0.61	0.55	0.53	0.71	0.58	0.66
Iron	29400	6850	21800	23100	156000	12700	8350
Lead	2130	67.3	271	573	1310	250	3.4
Magnesium	5990	594	1770	1700	2430	1160	1040
Manganese	473	62.3	252	258	1270	187	58.2
Mercury	0.42	0.16	0.41	0.11	1.7	0.27	0.13
Nickel	48.4	16.2	74.5	212	227	34.5	5.9
Potassium	1620	550	543	586	745	518	334
Selenium	0.73	0.74	0.66	0.64	0.85	0.7	
Silver	5.5	1.4	1.1	0.29	34.9	2.5	0.053
Sodium	2640	307	331	465	681	244	41.5
Thallium	0.98	0.98	0.88	0.85	1.1	0.93	0.79
Vanadium	47.6	16.8	14.8	15.6	823	35.1	4.5
Zinc	3080	582	1640	2360	2780	837	30.4

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION:	09-B7-04 Soil	09-B8-04 Soil	09-MW5-04 Soil	09-MW7-02 Soil	09-MW8-04 Soil	09-MW1105 Soil	09-MW12-03 Soil
	551265	551410	554385	552521	552896	554676	569338
VOLATILES (ug/kg)							
1,1-Dichloroethane	61	12	11	11	14	12	13
1,1-Dichloroethene	61	12	11	11	14	12	13
1,1,1-Trichloroethane	30.5	6	5.5	5.5	2	6	6.5
1,1,2-Trichloroethane	61	12	11	11	14	12	13
1,1,2,2-Tetrachloroethane	61	12	11	11	14	12	13
1,2-Dichloroethane	61	12	11	11	14	12	13
1,2-Dichloroethene(Total)	61	12	11	11	14	12	13
1,2-Dichloropropane	61	12	11	11	14	12	13
2-Butanone	61	12	11	11	11	12	13
2-Hexanone	61	12	11	11	14	12	13
4-Methyl-2-pentanone	61	12	11	11	14	12	13
Acetone	61	100	17	18	68	12	53
Benzene	61	12	11	11	14	12	13
Bromodichloromethane	61	12	11	11	14	12	13
Bromoform	61	12	11	11	14	12	13
Bromomethane	61	12	11	11	14	12	13
Carbon disulfide	61	12	11	11	14	12	13
Carbon tetrachloride	61	12	11	11	14	12	13
Chlorobenzene	61	12	11	3	14	180	13
Chloroethane	61	12	11	11	14	12	13
Chloroform	**30.5**	**6**	**5.5**	**5.5**	**7**	**6**	**6.5**
Chloromethane	61	12	11	11	14	12	13
Cis-1,3-Dichloropropene	61	12	11	11	14	12	13
Dibromochloromethane	61	12	11	11	14	12	13
Ethylbenzene	61	190	11	11	14	2	13
Methylene chloride	200	39	17	13	40	42	14
Styrene	61	12	11	11	14	12	13
Tetrachloroethene	61	12	2	11	2	12	13
Toluene	61	4	11	3	14	12	13
Trans-1,3-Dichloropropene	61	12	11	11	14	12	13
Trichloroethene	61	12	11	11	14	2	13
Vinyl acetate							
Vinyl chloride	61	12	11	11	14	12	13
Xylenes (Total)	20	4400	11	11	14	25	13

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-B7-04 Soil	09-B8-04 Soil	09-MW5-04 Soil	09-MW7-02 Soil	09-MW8-04 Soil	09-MW1105 Soil	09-MW12-03 Soil
	551265	551410	554385	552521	552896	554676	569338
SEMIVOLATILES (ug/kg)							
1,2-Dichlorobenzene	59	810	3650	1700	470	3800	430
1,2,4-Trichlorobenzene	200	405	3650	850	235	1900	215
1,3-Dichlorobenzene	400	810	3650	1700	470	3800	430
1,4-Dichlorobenzene	97	810	3650	1700	470	3800	430
2-Chloronaphthalene	400	810	3650	1700	470	3800	430
2-Chlorophenol	400	810	3650	1700	470	3800	430
2-Methylnaphthalene	3900	3300	1100	1200	470	5000	430
2-Methylphenol	58	405	3650	850	235	1900	215
2-Nitroaniline	970	2000	9000	4200	1100	9200	1000
2-Nitrophenol	400	810	3650	1700	470	3800	430
2,4-Dichlorophenol	400	810	3650	1700	470	3800	430
2,4-Dimethylphenol	400	810	3650	1700	470	3800	430
2,4-Dinitrophenol	970	2000	9000	4200	1100	9200	1000
2,4-Dinitrotoluene	400	810	3650	1700	470	3800	430
2,4,5-Trichlorophenol	970	2000	9000	4200	1100	9200	1000
2,4,6-Trichlorophenol	400	810	3650	1700	470	3800	430
2,6-Dinitrotoluene	400	810	3650	1700	470	3800	430
3-Nitroaniline	970	2000	9000	4200	1100	9200	1000
3,3'-Dichlorobenzidine	400	810	3650	1700	470	3800	430
4-Bromophenyl phenyl ether	400	810	3650	1700	470	3800	430
4-Chloro-3-methylphenol	400	810	3650	1700	470	3800	430
4-Chloroaniline	400	810	3650	1700	470	3800	430
4-Chlorophenyl phenyl ether	400	810	3650	1700	470	3800	430
4-Methylphenol	200	405	3650	850	235	1900	215
4-Nitroaniline	970	2000	9000	4200	1100	9200	1000
4-Nitrophenol	970	2000	9000	4200	1100	9200	1000
4,6-Dinitro-2-methylphenol	970	2000	9000	4200	1100	9200	1000
Acenaphthene	290	220	4600	1700	470	17000	430
Acenaphthylene	200	405	3650	850	51	1900	215
Anthracene	420	290	9000	260	150	23000	430
Benzoic acid							
Benzo(a)anthracene	1100	640	21000	250	960	41000	430
Benzo(a)pyrene	610	520	14000	1700	590	22000	430
Benzo(b)fluoranthene	1900	1300	31000	1700	1200	41000	430
Benzo(b)/Benzo(k)fluoroanthene							
Benzo(g,h,i)perylene	400	810	9800	1700	210	15000	430
Benzo(k)fluoranthene	1900	1300	31000	1700	1200	41000	430
Benzyl alcohol							
bis(2-Chloroethoxy)methane	400	810	3650	1700	470	3800	430
bis(2-Chloroethyl)ether	400	810	3650	1700	470	3800	430
bis(2-Chloroisopropyl)ether (a)	200	405	3650	850	65	1900	215
bis(2-Ethylhexyl)phthalate	2800	5600	3650	340	510	3900	430
Butyl benzyl phthalate	160	810	3650	310	58	3800	430
Carbazole	270	230	5500	1700	66	10000	430
Chrysene	1200	640	17000	310	960	21000	430
Dibenzofuran	310	160	2800	1700	470	12000	430
Dibenzo(a,h)anthracene	400	810	2800	1700	470	6400	430
Diethyl phthalate	44	405	3650	850	235	1900	215
Dimethyl phthalate	400	810	3650	1700	470	3800	430
Di-n-butyl phthalate	390	380	3650	850	470	1900	430
Di-n-octyl phthalate	400	810	3650	1700	470	3800	430
Fluoranthene	2700	1500	45000	480	1200	94000	430
Fluorene	370	300	5400	290	470	18000	430
Hexachlorobenzene	400	810	3650	1700	470	3800	430

TABLE C-2
SUBSURFACE SOIL DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION:	09-B7-04 Soil	09-B8-04 Soil	09-MW5-04 Soil	09-MW7-02 Soil	09-MW8-04 Soil	09-MW1105 Soil	09-MW12-03 Soil
Hexachlorobutadiene	400	810	3650	1700	470	3800	430
Hexachlorocyclopentadiene	400	810	3650	1700	470	3800	430
Hexachloroethane	400	810	3650	1700	470	3800	430
Indeno(1,2,3-cd)pyrene	400	170	8900	1700	270	15000	430
Isophorone	400	810	3650	1700	470	3800	430
Naphthalene	1000	1400	2500	190	470	19000	430
Nitrobenzene	400	810	3650	1700	470	3800	430
N-Nitroso-di-n-propylamine	400	810	3650	1700	470	3800	430
N-Nitrosodiphenylamine(1)	200	405	3650	850	235	1900	215
Pentachlorophenol	970	2000	9000	4200	1100	9200	1000
Phenanthrene	2000	1100	40000	810	630	110000	430
Phenol	400	810	3650	1700	470	3800	430
Pyrene	1500	900	38000	440	990	81000	430
	551265 D50	551410 D50	554385 D50	552521	552896 D50	554676	569338
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	23	320	110	3.5	150	3.8	4.3
4,4'-DDE	11	71	18	0.69	31	3.8	4.3
4,4'-DDT	20	66	66	3.5	23	14	4.3
Aldrin	2.9	5	2.4	3.6	1.7	2	2.2
Alpha chlordane	1.5	10	10	2.7	12	2.1	2.2
Alpha-BHC	5	5	0.11	0.31	6	0.089	1.1
Beta-BHC	10	10	9.4	0.44	12	2	2.2
Delta-BHC	5	5	4.7	0.9	6	1	1.1
Dieldrin	12	10	0.45	3.5	11.5	7.6	4.3
Endosulfan I	2.9	5	4.7	1.8	6	2	2.2
Endosulfan II	20	72	18	3.5	23	3.8	4.3
Endosulfan sulfate	20	20	18	3.5	23	3.8	4.3
Endrin	10	10	9	1.75	1.7	1.9	2.15
Endrin aldehyde	20	20	18	3.5	23	3.8	4.3
Endrin ketone	10	10	9	3.5	11.5	3.8	2.15
Gamma chlordane	3.2	5	5.9	7.6	6	0.34	2.2
Gamma-BHC (Lindane)	10	10	9.4	1.8	12	2	2.2
Heptachlor	5	5	4.7	0.2	6	1	1.1
Heptachlor epoxide	5	5	4.7	1.8	2.4	2	2.2
PCB-1016	200	200	180	35	230	38	43
PCB-1221	410	410	370	71	470	77	88
PCB-1232	200	200	180	35	230	38	43
PCB-1242	200	200	180	35	230	38	43
PCB-1248	200	200	180	35	230	38	43
PCB-1254	200	200	180	35	230	38	43
PCB-1260	1700	1500	770	570	200	130	43
p,p'-Methoxychlor	50	8	47	9	60	10	11
Toxaphene	1000	1000	940	180	1200	200	220

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION :	PHASE I GW-09-01B	GW-09-02B w/dup	GW-09-03B	GW-09-04B	GW-09-01-A	GW-09-02-A	GW-09-03-A	GW-09-04-A	PHASE II 09-MW1S	09-MW2S	09-MW3D	09-MW4S	09-MW5S
									567054	567065	567058	567052	567056
INORGANICS (ug/l)													
Aluminum	335	1940	1240	37700	1250	2020	3080	9180	44	355	44	105	55.8
Antimony	21	71	21	21	27	27	27	27	35	35	35	35	35
Arsenic	3	5.4	3	15	2	2	2	2	4	7.5	4	4	7.5
Barium	22.3	154	40.4	156	15.4	34.6	64.4	40.8	7.9	27.5	73.3	3.3	164
Beryllium	1	2.7	1	2.1	1	1	1	1	1	1	1	1	1
Cadmium	5	5.2	5	5	5	5	5	5	0.1	0.1	0.1	0.1	0.1
Calcium	65500	71800	12200	26400	66700	70400	20200	9740	114000	77800	23600	5810	95900
Chromium	5	5	5	9.2	6	6	13.5	9.5	8	8	8	8	8
Cobalt	4.4	12.3	10.2	49.6	5.5	8.1	17.5	14.3	9	9	9	9	9
Copper	11.1	66.4	20.3	72	7	7	28.5	28.4	4	8.2	4	4	6.3
Cyanide	5	5	5	5	5	5	5	5	5	5	5	5	5
Iron	10400	5410	5110	4610	11500	9430	8090	9360	20600	12400	3050	137	25500
Lead	3	19.1	5.4	25.5	14.4	7.5	10.1	10.1	2	2	2	2	2
Magnesium	10400	10800	5700	2640	10700	10800	5780	2100	14900	13000	17800	663	18400
Manganese	219	238	559	1910	204	220	1520	465	233	284	810	4.3	409
Mercury	0.2	0.22	0.2	0.2	0.28	0.32	0.32	0.28	0.2	0.2	0.2	0.2	0.2
Nickel	14.5	14.5	14.5	14.5	19	19	19	19	18	18	18	18	18
Potassium	6860	7160	6170	3230	5080	5830	5040	681	12800	10600	14600	1960	17700
Selenium	10	10	10	10	10	10	10	10	3	3	3	3	3
Silver	2	2	2	2	1.5	1.5	1.5	1.5	0.2	0.2	0.2	0.2	0.2
Sodium	8640	12700	80700	2570	8620	10500	137000	2080	10400	12000	63800	4440	32400
Thallium	2	2	2	2	2	2	2	2	3	3	3	3	3.9
Vanadium	6.5	18.4	9.4	23	5.6	8.1	13.5	14.8	6	6	6	6	6
Zinc	35.5	165	36.7	114	34.2	28.7	47	47	12.7	56.5	7.8	14.2	16.2

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE - SITE 09

	PHASE I								PHASE II				
TRC SAMPLE IDENTIFICATION :	GW-09-01B	GW-09-02B	GW-09-03B	GW-09-04B	GW-09-01-A	GW-09-02-A	GW-09-03-A	GW-09-04-A	09-MW1S	09-MW2S	09-MW3D	09-MW4S	09-MW5S
		w/dup							567001	567040	567004	566997	567002
VOLATILES (ug/l)													
1,1-Dichloroethane	5	5	5	5	5	5	5	5	10	10	10	10	10
1,1-Dichloroethene	5	5	5	5	5	5	5	5	10	10	10	10	10
1,1,1-Trichloroethane	5	5	5	5	5	5	5	5	10	10	10	10	10
1,1,2-Trichloroethane	5	5	5	5	5	5	5	5	10	10	10	10	10
1,1,2,2-Tetrachloroethane	5	5	5	5	5	5	5	5	10	10	10	10	10
1,2-Dichloroethane	5	5	2	5	5	5	5	5	10	10	10	10	10
1,2-Dichloroethene(Total)	5	1	72	5	5	5	49	5	10	2	110	10	4
1,2-Dichloropropane	5	5	5	5	5	5	5	5	10	10	10	10	10
2-Butanone	10	10	10	10	10	10	10	10	10	10	10	10	10
2-Hexanone	10	10	10	10	10	10	10	10	10	10	10	10	10
4-Methyl-2-pentanone	10	10	10	10	10	10	10	10	10	10	10	10	10
Acetone	10	8	10	10	10	10	10	10	10	10	10	10	10
Benzene	5	2	5	5	5	3	5	5	10	7	10	10	3
Bromodichloromethane	5	5	5	5	5	5	5	5	10	10	10	10	10
Bromoform	5	5	5	5	5	5	5	5	10	10	10	10	10
Bromomethane	10	10	10	10	10	10	10	10	10	10	10	10	10
Carbon disulfide	5	5	5	5	5	5	5	5	10	10	10	10	10
Carbon tetrachloride	5	5	5	5	5	5	5	5	10	10	10	10	10
Chlorobenzene	5	5	5	5	5	18	5	5	10	85	10	10	1
Chloroethane	5	5	5	5	5	5	5	5	5	5	5	5	5
Chloroform	5	5	5	5	5	5	5	5	10	10	10	10	10
Chloromethane	10	10	10	10	10	10	10	10	10	10	10	10	10
Cis-1,3-Dichloropropene	5	5	5	5	5	5	5	5	10	10	10	10	10
Dibromochloromethane	5	5	5	5	5	5	5	5	10	10	10	10	10
Ethylbenzene	5	12	5	5	5	31	5	5	10	87	10	10	9
Methylene chloride	5	12	5	5	10	10	5	5	10	10	10	10	10
Styrene	5	5	5	5	5	5	5	5	10	10	10	10	10
Tetrachloroethene	5	5	5	5	5	5	5	5	10	10	10	10	10
Toluene	5	15	5	5	5	2	5	5	10	3	10	10	28
Trans-1,3-Dichloropropene	5	5	5	5	5	5	5	5	10	10	10	10	10
Trichloroethene	5	1	5	5	5	3	2	5	10	10	10	10	10
Vinyl acetate	10	10	10	10	10	10	10	10					
Vinyl chloride	10	10	13	10	10	10	8	10	10	10	12	10	10
Xylenes (Total)	5	22	5	5	5	55	5	5	10	190	10	10	27

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE - SITE 09

	PHASE I								PHASE II				
TRC SAMPLE IDENTIFICATION :	GW-09-01B	GW-09-02B	GW-09-03B	GW-09-04B	GW-09-01-A	GW-09-02-A	GW-09-03-A	GW-09-04-A	09-MW1S	09-MW2S	09-MW3D	09-MW4S	09-MW5S
		w/dup							567001	567040	567004	566997	567002
SEMIVOLATILES (ug/l)													
1,2-Dichlorobenzene	10	10	10	10	10	10	10	10	10	10	10	10	10
1,2,4-Trichlorobenzene	10	10	10	10	10	10	10	10	10	10	10	10	10
1,3-Dichlorobenzene	10	10	10	10	10	10	10	10	10	10	10	10	10
1,4-Dichlorobenzene	10	10	10	10	10	10	10	10	10	5	10	10	10
2-Chloronaphthalene	10	10	10	10	10	10	10	10	10	10	10	10	10
2-Chlorophenol	5	5	5	5	5	5	5	5	5	5	5	5	5
2-Methylnaphthalene	10	10	10	10	10	3	10	10	10	4	10	10	25
2-Methylphenol	10	10	10	10	10	10	10	10	10	10	10	10	73
2-Nitroaniline	50	50	50	50	50	50	50	50	25	25	25	25	25
2-Nitrophenol	10	10	10	10	10	10	10	10	10	10	10	10	10
2,4-Dichlorophenol	5	5	5	5	5	5	5	5	5	5	5	5	5
2,4-Dimethylphenol	10	10	10	10	10	10	10	10	10	1	10	10	260
2,4-Dinitrophenol	50	50	50	50	50	50	50	50	25	25	25	25	25
2,4-Dinitrotoluene	10	10	10	10	10	10	10	10	10	10	10	10	10
2,4,5-Trichlorophenol	50	50	50	50	20	20	20	20	25	25	25	25	25
2,4,6-Trichlorophenol	10	10	10	10	50	20	20	20	10	10	10	10	10
2,6-Dinitrotoluene	10	10	10	10	10	10	10	10	10	10	10	10	10
3-Nitroaniline	50	50	50	50	50	50	50	50	25	25	25	25	25
3,3'-Dichlorobenzidine	20	20	20	20	20	20	20	20	10	10	10	10	10
4-Bromophenyl phenyl ether	10	10	10	10	10	10	10	10	10	10	10	10	10
4-Chloro-3-methylphenol	10	10	10	10	10	10	10	10	10	10	10	10	10
4-Chloroaniline	10	10	10	10	10	10	10	10	10	10	10	10	10
4-Chlorophenyl phenyl ether	10	10	10	10	10	10	10	10	10	10	10	10	10
4-Methylphenol	10	10	10	10	10	10	10	10	10	10	10	10	210
4-Nitroaniline	25	25	25	25	25	25	25	25	12.5	12.5	12.5	12.5	12.5
4-Nitrophenol	25	25	25	25	25	25	25	25	12.5	12.5	12.5	1	12.5
4,6-Dinitro-2-methylphenol	50	50	50	50	50	50	50	50	25	25	25	25	25
Acenaphthene	10	10	10	10	10	10	10	10	10	10	10	10	66
Acenaphthylene	10	10	10	10	10	10	10	10	10	10	10	10	10
Anthracene	10	10	10	10	10	10	10	10	10	10	10	10	22
Benzoic acid	50	50	50	50	50	50	50	50					
Benzo(a)anthracene	10	10	10	10	10	10	10	10	10	10	10	10	10
Benzo(a)pyrene	10	10	10	10	10	10	10	10	10	10	10	10	10
Benzo(b)fluoranthene	10	10	10	10	10	10	10	10	10	10	10	10	10
Benzo(b)/Benzo(k)fluoranthene													
Benzo(g,h,i)perylene	10	10	10	10	10	10	10	10	10	10	10	10	10
Benzo(k)fluoranthene	10	10	10	10	10	10	10	10	10	10	10	10	10
Benzyl alcohol	10	10	10	10	10	10	10	10					
bis(2-Chloroethoxy)methane	10	10	10	10	10	10	10	10	10	10	10	10	10
bis(2-Chloroethyl)ether	10	10	3	10	10	10	2	10	10	2	4	10	10
bis(2-Chloroisopropyl)ether (a)	5	5	3	5	5	5	5	5	5	5	3	5	5
bis(2-Ethylhexyl)phthalate	10	10	10	10	10	10	10	10	10	10	10	10	10
Butyl benzyl phthalate	10	10	10	10	10	10	10	10	10	10	10	10	10
Carbazole	10	10	10	10	10	10	10	10	10	10	10	10	10
Chrysene	10	10	10	10	10	10	10	10	10	10	10	10	10
Dibenzofuran	10	10	10	10	10	10	10	10	10	10	10	10	24
Dibenzo(a,h)anthracene	10	10	10	10	10	10	10	10	10	10	10	10	10
Diethyl phthalate	5	5	5	5	5	5	5	5	5	5	5	5	5
Dimethyl phthalate	10	10	10	10	10	10	10	10	10	10	10	10	10
Di-n-butyl phthalate	5	5	5	5	5	5	5	5	5	1	5	5	5
Di-n-octyl phthalate	10	10	10	10	10	10	10	10	10	10	10	10	10
Fluoranthene	5	5	5	5	5	5	5	5	5	5	5	5	2
Fluorene	10	10	10	10	10	10	10	10	10	10	10	10	23
Hexachlorobenzene	10	10	10	10	10	10	10	10	10	10	10	10	10

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION :	PHASE I GW-09-01B	GW-09-02B	GW-09-03B	GW-09-04B	GW-09-01-A	GW-09-02-A	GW-09-03-A	GW-09-04-A	PHASE II 09-MW1S	09-MW2S	09-MW3D	09-MW4S	09-MW5S
		w/dup											
Hexachlorobutadiene	10	10	10	10	10	10	10	10	10	10	10	10	10
Hexachlorocyclopentadiene	10	10	10	10	10	10	10	10	10	10	10	10	10
Hexachloroethane	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	3	**5**	**5**	**5**
Indeno(1,2,3-cd)pyrene	10	10	10	10	10	10	10	10	10	10	10	10	10
Isophorone	10	10	10	10	10	10	10	10	10	10	10	10	10
Naphthalene	10	10	10	10	10	5	10	10	10	13	10	10	47
Nitrobenzene	10	10	10	10	10	10	10	10	10	10	10	10	10
N-Nitroso-di-n-propylamine	10	10	10	10	10	10	10	10	10	10	10	1	10
N-Nitrosodiphenylamine(1)	10	10	10	10	10	10	10	10	10	10	10	10	10
Pentachlorophenol	**25**	**25**	**25**	**25**	**25**	**10**	**10**	**10**	**12.5**	**12.5**	**12.5**	**12.5**	**12.5**
Phenanthrene	10	10	10	10	10	10	10	10	10	10	10	10	21
Phenol	10	10	10	10	10	10	10	10	10	10	10	10	72
Pyrene	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	3
									567001	567040	567004	566997	567002
PESTICIDES/PCBs (ug/kg)													
4,4'-DDD	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**
4,4'-DDE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4,4'-DDT	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aldrin	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Alpha chlordane	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.025**	**0.025**	**0.025**	**0.025**	0.012
Alpha-BHC	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Beta-BHC	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Delta-BHC	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Dieldrin	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**
Endosulfan I	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Endosulfan II	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Endosulfan sulfate	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Endrin	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Endrin aldehyde									0.1	0.1	0.1	0.1	0.1
Endrin ketone	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Gamma chlordane	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.05	0.05	0.05	0.05	0.05
Gamma-BHC (Lindane)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Heptachlor	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.005
Heptachlor epoxide	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Aroclor-1016	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1
Aroclor-1221	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	2	2	2	2
Aroclor-1232	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1
Aroclor-1242	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1
Aroclor-1248	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1
Aroclor-1254	1	1	1	1	1	1	1	1	1	1	1	1	1
Aroclor-1260	1	1	1	1	1	1	1	1	1	1	1	1	1
p,p'-Methoxychlor	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Toxaphene	1	1	1	1	1	1	1	1	5	5	5	5	5

Bolded : 1/2 SQL
Shaded : Detected value
Italicised : Data averaged with duplicate
Dark shaded : Rejected data
(a) Reported as bis(2-chloroisopropyl)ether in Phase I and as 2,2'-oxybis(1-chloropropane) in Phase II

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION :	09-MW6S	09-MW6D	09-MW7S	09-MW7D	09-MW8S	09-MW8D	09-MW9S	09-MW9D	09-MW10S	09-MW10D	09-MW11S	09-MW12D	09-MW13S	09-MW13D
			w/09-MW15S											
	566261	566247	567062	566266	566265	567063	566263	566267	567057	567059	567053	574045	567584	567582
INORGANICS (ug/l)														
Aluminum	44	2040	*44*	44	44	807	170	7240	50.2	516	44	72.8	331	649
Antimony	47.4	35	*35*	35	35.5	35	35	35	35	35	35	35	35	35
Arsenic	5.1	4	*14.9*	5.5	4	5.4	4	4	4	4	4	4	4	4
Barium	753	36.5	*40.7*	278	76.9	85.8	501	87.5	130	42.2	31.7	25.5	12.3	11.9
Beryllium	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1
Cadmium	0.1	0.28	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.22	0.1	0.1
Calcium	140000	11300	*80550*	127000	70800	78900	95600	47600	81200	27500	52000	15600	10600	18600
Chromium	8	8	*8*	8	8	8	8.7	26.3	8	8	8	8	8	8
Cobalt	9	9	*9*	9	9	9	9	9	9	9	9	43.4	13.9	9
Copper	4.2	7.1	*4*	4	4	4.1	4	13.2	4	7.8	4.1	4	4	4
Cyanide	5		*5*	5	5	5	5	5	5	6.2	5	5	5	5
Iron	23800	7460	*12600*	47300	1540	12700	14100	16800	12500	1110	6510	3540	2710	2450
Lead	2	2.9	*2.85*	2	2	2	2	2.8	2	3.6	2	2	2	2
Magnesium	60700	4170	*37850*	57500	36200	18300	60500	30000	45200	4620	3980	2910	3060	3080
Manganese	662	917	*174.5*	1420	600	889	791	1160	275	500	713	546	368	307
Mercury	0.2	0.2	*0.2*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel	18	18	*18*	18	18	18	18	18	18	18	18	18	18.6	18
Potassium	38500	2570	*28300*	6840	29500	5120	37400	9840	28700	5570	8020	3720	1270	2660
Selenium	3	3	*3*	3	3	3	3	3	3	3	3	3	3	3
Silver	0.54	0.2	*0.2*	0.71	0.36	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Sodium	50800	13500	*25900*	230000	200000	83100	53000	119000	89000	16200	6380	21900	6070	10800
Thallium	3	3	*3*	3	3	3	3	3	3.3	3	3	3	3	3
Vanadium	6	6	*6*	6	6	6	6	8.9	6	6	6	6	6	6
Zinc	9	56.7	*4*	11	28	65.4	4	44	8.1	55.3	7.5	32	142	49.2

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE - SITE 09

TRC SAMPLE IDENTIFICATION :	09-MW6S	09-MW6D	09-MW7S	09-MW7D	09-MW8S	09-MW8D	09-MW9S	09-MW9D	09-MW10S	09-MW10D	09-MW11S	09-MW12D	09-MW13S	09-MW13D
			w/09-MW15S											
	566235	566232		566243	566242	567036	566238	566244	567003	567005	567000	574044	567266	567264
VOLATILES (ug/l)														
1,1-Dichloroethane	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
1,1-Dichloroethene	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
1,1,1-Trichloroethane	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
1,1,2-Trichloroethane	62	10	*10*	850	10	10	10	48	10	10	33	10	10	10
1,1,2,2-Tetrachloroethane	62	10	*10*	850	10	10	10	9	10	10	33	10	10	10
1,2-Dichloroethane	62	10	*10*	320	10	2	10	17	10	10	33	10	10	10
1,2-Dichloroethene(Total)	510	10	*3*	28000	11	4	1	280	10	10	33	10	10	2
1,2-Dichloropropane	940	10	*10*	230	10	2	10	17	10	10	33	10	10	10
2-Butanone	62	10	*10*	4500	10	10	10	17	10	10	33	10	10	10
2-Hexanone	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
4-Methyl-2-pentanone	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Acetone	62	10	*10*	3000	10	10	10	17	10	10	33	10	10	10
Benzene	31	10	*10.5*	850	2	10	1	8.5	10	10	9	10	10	10
Bromodichloromethane	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Bromoform	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Bromomethane	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Carbon disulfide	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Carbon tetrachloride	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Chlorobenzene	62	10	*10*	850	10	2	10	17	10	10	620	10	10	10
Chloroethane	31	5	*5*	850	5	5	5	8.5	5	5	16.5	5	5	5
Chloroform	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Chloromethane	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Cis-1,3-Dichloropropene	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Dibromochloromethane	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Ethylbenzene	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Methylene chloride	66	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Styrene	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Tetrachloroethene	670	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Toluene	31	10	*10*	850	10	10	10	17	10	10	16.5	10	10	10
Trans-1,3-Dichloropropene	62	10	*10*	850	10	10	10	17	10	10	33	10	10	10
Trichloroethene	74	10	*10*	1200	10	10	3	56	10	10	33	10	10	10
Vinyl acetate														
Vinyl chloride	62	10	3	7000	25	10	10	5	10	10	33	10	10	10
Xylenes (Total)	62	10	*3*	850	10	10	10	17	10	10	33	10	10	10

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION :	09-MW6S	09-MW6D	09-MW7S w/09-MW15S	09-MW7D	09-MW8S	09-MW8D	09-MW9S	09-MW9D	09-MW10S	09-MW10D	09-MW11S	09-MW12D	09-MW13S	09-MW13D
	566235	566232		566243	566242	567036	566238	566244	567003	567005	567000	574044	567583	567581
SEMIVOLATILES (ug/l)														
1,2-Dichlorobenzene	75	10	1	100	10	10	10	10	10	10	8	10	10	10
1,2,4-Trichlorobenzene	75	10	10	100	10	10	10	10	10	10	8	10	10	10
1,3-Dichlorobenzene	75	10	10	100	10	10	10	10	10	10	83	10	10	10
1,4-Dichlorobenzene	75	10	10	100	10	10	10	10	10	10	420	10	10	10
2-Chloronaphthalene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
2-Chlorophenol	75	5	5	50	5	5	5	5	5	5	3	5	5	5
2-Methylnaphthalene	75	10	14	100	10	10	10	10	10	10	10	10	10	10
2-Methylphenol	350	10	10		10	10	10	10	10	10	10	10	10	10
2-Nitroaniline	190	25	25	250	25	25	25	25	25	25	25	25	25	25
2-Nitrophenol	75	10	10	100	10	10	10	10	10	10	10	10	10	10
2,4-Dichlorophenol	75	5	5	50	5	5	5	5	5	5	4	5	5	5
2,4-Dimethylphenol	860	10	9.5	16	10	10	10	10	10	10	10	10	10	10
2,4-Dinitrophenol	190	25	25	250	25	25	25	25	25	25	25	25	25	25
2,4-Dinitrotoluene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
2,4,5-Trichlorophenol	190	25	25	250	25	25	25	25	25	25	25	25	25	25
2,4,6-Trichlorophenol	75	10	10	100	10	10	10	10	10	10	10	10	10	10
2,6-Dinitrotoluene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
3-Nitroaniline	190	25	25	250	25	25	25	25	25	25	25	25	25	25
3,3'-Dichlorobenzidine	75	10	10	100	10	10	10	10	10	10	10	10	10	10
4-Bromophenyl phenyl ether	75	10	10	100	10	10	10	10	10	10	10	10	10	10
4-Chloro-3-methylphenol	75	10	10	100	10	10	10	10	10	10	10	10	10	10
4-Chloroaniline	75	10	10	100	10	10	10	10	10	10	10	10	10	10
4-Chlorophenyl phenyl ether	75	10	10	100	10	10	10	10	10	10	10	10	10	10
4-Methylphenol	370	10	10		10	10	10	10	10	10	10	10	10	10
4-Nitroaniline	190	12.5	12.5	125	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
4-Nitrophenol	190	12.5	12.5	125	12.5	12.5	12.5	12.5	12.5	12.5	12.5	3	12.5	12.5
4,6-Dinitro-2-methylphenol	190	25	25	250	25	25	25	25	25	25	25	25	25	25
Acenaphthene	75	10	5	50	10	10	10	10	10	10	10	10	10	10
Acenaphthylene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Anthracene	75	10	10	50	10	10	10	10	10	10	10	10	10	10
Benzoic acid														
Benzo(a)anthracene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Benzo(a)pyrene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Benzo(b)fluoranthene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Benzo(b)/Benzo(k)fluoranthene														
Benzo(g,h,i)perylene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Benzo(k)fluoranthene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Benzyl alcohol														
bis(2-Chloroethoxy)methane	75	10	10	100	10	10	10	10	10	10	10	10	10	10
bis(2-Chloroethyl)ether	75	10	1	14	10	10	10	10	10	10	10	10	10	10
bis(2-Chloroisopropyl)ether (a)	75	5	5	50	5	5	5	5	2	5	5	5	5	5
bis(2-Ethylhexyl)phthalate	75	39	10	100	10	10	10	10	10	10	10	10	10	10
Butyl benzyl phthalate	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Carbazole	75	10	10.5	100	10	10	10	10	10	10	10	10	10	10
Chrysene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Dibenzofuran	75	10	2	50	10	10	10	10	10	10	10	10	10	10
Dibenzo(a,h)anthracene	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Diethyl phthalate	75	5	5	50	5	5	5	2	5	5	5	5	5	2
Dimethyl phthalate	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Di-n-butyl phthalate	75	5	5	50	5	5	5	5	5	5	5	5	5	5
Di-n-octyl phthalate	75	10	10	100	10	10	10	10	10	10	10	10	10	10
Fluoranthene	75	5	5	50	5	5	5	5	5	5	5	5	5	5
Fluorene	75	10	3	100	10	10	10	10	10	10	10	10	10	10
Hexachlorobenzene	75	10	10	100	10	10	10	10	10	10	10	10	10	10

TABLE C-3
GROUND WATER DATA
NCBC DAVISVILLE – SITE 09

TRC SAMPLE IDENTIFICATION :	09-MW6S	09-MW6D	09-MW7S w/09-MW15S	09-MW7D	09-MW8S	09-MW8D	09-MW9S	09-MW9D	09-MW10S	09-MW10D	09-MW11S	09-MW12D	09-MW13S	09-MW13D
Hexachlorobutadiene	75	10	*10*	100	10	10	10	10	10	10	10	10	10	10
Hexachlorocyclopentadiene	75	10	*10*	100	10	10	10	10	10	10	10	10	10	10
Hexachloroethane	75	5	*5*	50	5	5	5	5	5	5	5	5	5	5
Indeno(1,2,3-cd)pyrene	75	10	*10*	100	10	10	10	10	10	10	10	10	10	10
Isophorone	75	10	*10*	100	10	10	10	10	10	10	10	10	10	10
Naphthalene	75	10	29	100	10	10	1	10	10	10	1	10	10	10
Nitrobenzene	75	10	*10*	100	10	10	10	10	10	10	10	10	10	10
N-Nitroso-di-n-propylamine	75	10	*10*	100	10	10	10	10	10	10	10	10	10	10
N-Nitrosodiphenylamine(1)	75	10	*10*	100	10	10	10	10	10	10	10	10	10	10
Pentachlorophenol	190	12.5	2	125	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Phenanthrene	75	10	*10*	50	10	10	10	10	10	10	10	10	10	10
Phenol	66	10	*10*		10	10	10	2	10	10	10	10	10	10
Pyrene	75	5	*5*	50	5	5	5	5	5	5	5	5	5	5
	566235	566232		566243	566242	567036	566238	566244	567003	567005	567000	574044	567583	567581
PESTICIDES/PCBs (ug/kg)														
4,4'-DDD	0.05	0.05	*0.05*	0.05	0.05	0.05	0.0037	0.05	0.05	0.05	0.05	0.05	0.05	0.05
4,4'-DDE	0.1	0.1	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4,4'-DDT	0.1	0.1	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aldrin	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Alpha chlordane	0.025	0.025	*0.025*	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Alpha-BHC	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Beta-BHC	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Delta-BHC	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Dieldrin	0.05	0.05	*0.05*	0.05	0.05	0.05	0.0024	0.0024	0.05	0.05	0.05	0.05	0.05	0.05
Endosulfan I	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Endosulfan II	0.1	0.1	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Endosulfan sulfate	0.1	0.1	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Endrin	0.1	0.1	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Endrin aldehyde	0.1	0.1	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Endrin ketone	0.1	0.1	*0.1*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Gamma chlordane	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Gamma-BHC (Lindane)	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Heptachlor	0.05	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Heptachlor epoxide	0.002	0.05	*0.05*	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Aroclor-1016	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1
Aroclor-1221	2	2	*2*	2	2	2	2	2	2	2	2	2	2	2
Aroclor-1232	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1
Aroclor-1242	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1
Aroclor-1248	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1
Aroclor-1254	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1
Aroclor-1260	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1
p,p'-Methoxychlor	0.5	0.5	*0.5*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Toxaphene	5	5	*5*	5	5	5	5	5	5	5	5	5	5	5

TABLE C-4
SURFACE WATER DATA
NCBC DAVISVILLE – SITE 09

Sample ID:	09-SW04	09-SW07	09-SW09	09-SW10
Sample Date:	05/04/93	05/04/93	05/04/93	05/04/93
Sample Type:	Surface Water	Surface Water	Surface Water	Surface Water
INORGANICS (ug/l)				
Aluminum	339	201	196	1470
Antimony	36	36	36	36
Arsenic	3	3	3	4.2
Barium	8.4	9.1	7.1	19.3
Beryllium	1	1	1	1
Cadmium	0.1	0.1	0.1	0.14
Calcium	12500	11900	19900	68100
Chromium	8	8	8	11.6
Cobalt	8	8	8	8
Copper	6.1	4.3	4	25.1
Cyanide	10	10	10	10
Iron	1380	1220	580	7270
Lead	2.5	3.1	2.1	15.1
Magnesium	19600	8110	35400	190000
Manganese	76.6	63	41	137
Mercury	0.2	0.2	0.2	0.2
Nickel	17	17	17	17
Potassium	8570	5400	12800	69100
Selenium	3	3	3	3
Silver	0.2	0.2	0.2	0.23
Sodium	168000	59500	289000	1750000
Thallium	4	4	4	4
Vanadium	6	6	6	12.1
Zinc	7.8	38.7	16.6	87.5

TABLE C-4
SURFACE WATER DATA
NCBC DAVISVILLE - SITE 09

Sample ID: Sample Date: Sample Type:	09-SW04 05/04/93 Surface Water	09-SW07 05/04/93 Surface Water	09-SW09 05/04/93 Surface Water	09-SW10 05/04/93 Surface Water
VOLATILES (ug/l)				
Acetone	10	10	10	10
Benzene	10	10	10	10
Bromodichloromethane	10	10	10	10
Bromoform	10	10	10	10
Bromomethane	10	10	10	10
Butanone, 2-	10	10	10	10
Carbon disulfide	5	5	2	5
Carbon tetrachloride	10	10	10	10
Chlorobenzene	10	10	10	10
Chloroethane	10	10	10	10
Chloroform	10	10	10	10
Chloromethane	10	10	10	10
Dibromochloromethane	10	10	10	10
Dichloroethane, 1,1-	10	10	10	10
Dichloroethane, 1,2-	10	10	10	10
Dichloroethene, 1,2- (total)	5	5	5	6
Dichloroethene, 1,1-	10	10	10	10
Dichloropropane, 1,2-	10	10	10	10
Dichloropropene, cis-1,3-	10	10	10	10
Dichloropropene, trans-1,3-	10	10	10	10
Ethylbenzene	10	10	10	10
Hexanone, 2-	10	10	10	10
Methyl-2-pentanone, 4-	10	10	10	10
Methylene chloride	10	10	10	10
Styrene	10	10	10	10
Tetrachloroethane, 1,1,2,2-	5	5	5	3
Tetrachloroethene	10	10	10	10
Toluene	10	10	10	10
Trichloroethane, 1,1,1-	10	10	10	10
Trichloroethane, 1,1,2-	10	10	10	10
Trichloroethene	5	5	5	2
Vinyl chloride	10	10	10	10
Xylenes (Total)	10	10	10	10

TABLE C-4
SURFACE WATER DATA
NCBC DAVISVILLE - SITE 09

Sample ID: Sample Date: Sample Type:	09-SW04 05/04/93 Surface Water	09-SW07 05/04/93 Surface Water	09-SW09 05/04/93 Surface Water	09-SW10 05/04/93 Surface Water
SEMIVOLATILES (ug/l)				
Acenaphthene	10	10	10	10
Acenaphthylene	10	10	10	10
Anthracene	10	10	10	10
Benzo(a)anthracene	10	10	10	10
Benzo(a)pyrene	10	10	10	10
Benzo(b)fluoranthene	10	10	10	10
Benzo(g,h,i)perylene	10	10	10	10
Benzo(k)fluoranthene	10	10	10	10
Bis(2-chloroethoxy)methane	10	10	10	10
Bis(2-chloroethyl)ether	10	10	10	10
Bis(2-chloroisopropyl)ether (a)	10	10	10	10
Bis(2-ethylhexyl)phthalate	58	10	10	10
Bromophenyl phenyl ether, 4-	10	10	10	10
Butyl benzyl phthalate	10	10	10	10
Carbazole	10	10	10	10
Chloro-3-methylphenol, 4-	10	10	10	10
Chloroaniline, 4-	10	10	10	10
Chloronaphthalene, 2-	10	10	10	10
Chlorophenol, 2-	10	10	10	10
Chlorophenyl phenyl ether, 4-	10	10	10	10
Chrysene	10	10	10	10
Dibenzofuran	10	10	10	10
Dibenzo(a,h)anthracene	10	10	10	10
Dichlorobenzene1 1,3-	10	10	10	10
Dichlorobenzene, 1,2-	10	10	10	10
Dichlorobenzene, 1,4-	10	10	10	10
Dichlorobenzidine, 3,3'-	10	10	10	10
Dichlorophenol, 2,4-	10	10	10	10
Diethyl phthalate	10	10	10	10
Dimethyl phthalate	10	10	10	10
Dimethylphenol, 2,4-	10	10	10	10
Di-n-butyl phthalate	10	10	10	10
Dinitro-2-methylphenol, 4,6-	25	25	25	25
Dinitrophenol, 2,4-	25	25	25	25
Dinitrotoluene, 2,4-	10	10	10	10
Dinitrotoluene, 2,6-	10	10	10	10
Di-n-octyl phthalate	10	10	10	10
Fluoranthene	10	10	10	10
Fluorene	10	10	10	10
Hexachlorobenzene	10	10	10	10
Hexachlorobutadiene	10	10	10	10
Hexachlorocyclopentadiene	10	10	10	10
Hexachloroethane	10	10	10	10
Indeno(1,2,3-cd)pyrene	10	10	10	10
Isophorone	10	10	10	10
Methylnaphthalene, 2-	10	10	10	10
Methylphenol, 2-	10	10	10	10
Methylphenol, 4-	10	10	10	10
Naphthalene	10	10	10	10
Nitroaniline, 2-	25	25	25	25
Nitroaniline, 3-	25	25	25	25
Nitroaniline, 4-	25	25	25	25
Nitrobenzene	10	10	10	10

TABLE C-4
SURFACE WATER DATA
NCBC DAVISVILLE - SITE 09

Sample ID:	09-SW04	09-SW07	09-SW09	09-SW10
Sample Date:	05/04/93	05/04/93	05/04/93	05/04/93
Sample Type:	Surface Water	Surface Water	Surface Water	Surface Water
Nitrophenol, 2-	10	10	10	10
Nitrophenol, 4-	25	25	25	25
Nitroso-di-n-propylamine, n-	10	10	10	10
Nitrosodiphenylamine, n-	10	10	10	10
Pentachlorophenol	25	25	25	25
Phenanthrene	10	10	10	10
Phenol	10	10	10	10
Pyrene	10	10	10	10
Trichlorobenzene, 1,2,4-	10	10	10	10
Trichlorophenol, 2,4,5-	25	25	25	25
Trichlorophenol, 2,4,6-	10	10	10	10
PESTICIDES/PCBs (ug/l)				
Aldrin	0.05	0.05	0.05	0.05
BHC, alpha-	0.05	0.05	0.05	0.05
BHC, beta-	0.05	0.05	0.05	0.05
BHC, delta-	0.05	0.05	0.05	0.05
BHC, gamma- (Lindane)	0.05	0.05	0.05	0.05
Chlordane, alpha-	0.05	0.05	0.05	0.05
Chlordane, gamma-	0.05	0.05	0.05	0.05
DDD, 4,4'-	0.1	0.1	0.1	0.1
DDE, 4,4'-	0.1	0.1	0.1	0.1
DDT, 4,4'-	0.1	0.1	0.1	0.1
Dieldrin	0.1	0.1	0.1	0.1
Endosulfan I	0.05	0.05	0.05	0.05
Endosulfan II	0.1	0.1	0.1	0.1
Endosulfan sulfate	0.1	0.1	0.1	0.1
Endrin	0.1	0.1	0.1	0.1
Endrin aldehyde	0.1	0.1	0.1	0.1
Endrin ketone	0.1	0.1	0.1	0.1
Heptachlor	0.05	0.05	0.05	0.05
Heptachlor epoxide	0.05	0.05	0.05	0.05
Methoxychlor, p,p'-	0.5	0.5	0.5	0.5
Toxaphene	5	5	5	5
Aroclor-1016	1	1	1	1
Aroclor-1221	2	2	2	2
Aroclor-1232	1	1	1	1
Aroclor-1242	1	1	1	1
Aroclor-1248	1	1	1	1
	1	1	1	1
	1	1	1	1

Bolded : 1/2 SQL
Shaded : Detected value
Italicized : Data averaged with duplicate
(a) Data shown here for bis(2-chloroisopropyl)ether reported as 2,2-oxybis(1-chloropropane)

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*	Clam*
Sampling Station:	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH3	AH5	AH7	AH7	AH7	AH7
Area :	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor
Sample No.:	798058	798458	798459	798460	798648	798649	798650	798848	798849	798850	798057	798062	798449	798450	798451	798639
Date:	11/09/88	04/26/90	04/26/90	04/26/90	06/19/90	06/19/90	06/19/90	09/18/90	09/18/90	09/18/90	11/09/88	11/09/88	04/26/90	04/26/90	04/26/90	06/19/90
Phase:	I	II	II	II	II	II	II	II	II	II	I	I	II	II	II	II
INORGANICS (mg/kg)																
Chemistry ID No.:	10672,3,4	18333	18334	18335	18345	18346	18347	18358	18359	18360	10669	11589	18336	18337	18338	18348
Replicate:	Averaged	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wet weight:	18.29	15.08	14.99	15.09	15.10	14.90	14.84	15.50	15.20	14.11	22.30	17.66	15.14	15.06	15.10	15.14
Dry weight:	2.85	1.66	1.65	1.54	1.68	1.59	1.59	1.94	1.95	1.94	3.43	1.89	1.54	1.57	1.54	1.55
Dry:Wet Weight Ratio:	0.154	0.110	0.110	0.102	0.111	0.107	0.107	0.125	0.128	0.137	0.155	0.107	0.102	0.104	0.102	0.102
Arsenic	0.30	0.45	0.45	0.39	0.40	0.43	0.45	0.47	0.49	0.55	0.27	0.60	0.56	0.39	0.47	0.48
Cadmium	0.089	0.106	0.117	0.112	0.112	0.094	0.094	0.045	0.046	0.049	0.138	0.093	0.116	0.070	0.099	0.079
Chromium	0.020	0.642	0.156	0.118	0.095	0.066	0.063	0.051	0.045	0.027	0.016	0.031	0.646	0.261	0.261	0.098
Copper	2.6	1.5	1.8	1.5	3.0	1.9	2.0	2.1	1.3	1.9	3.2	2.8	3.0	1.5	1.9	1.6
Iron	33.9	29.8	21.8	27.7	36.5	27.0	29.9	40.9	34.2	37.1	37.0	17.0	46.0	25.8	27.0	29.2
Lead	0.35	0.12	0.19	0.16	0.19	0.11	0.16	0.18	0.14	0.16	0.36	0.09	0.22	0.31	0.18	0.11
Manganese	9.7	4.3	5.4	3.1	5.4	3.3	3.1	6.0	6.5	4.0	12.2	3.3	3.7	2.3	4.6	2.3
Mercury	0.0089										0.0097					
Nickel	0.65	1.68	1.39	1.09	1.19	1.09	1.02	1.11	1.06	1.28	0.88	1.18	2.18	1.23	1.67	1.29
Silver	0.14										0.18	0.11				
Zinc	15.4	12.4	14.3	12.0	13.3	12.0	11.0	13.3	14.5	15.1	19.1	13.9	13.2	9.9	14.9	11.9
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:	10317										10316	11323				
Replicate:	A										A	A				
Wet weight:	11.21	10.01	10.62	8.75	10.73	10.14	11.11	11.10	10.68	10.75	10.42	10.26	10.56	10.58	10.30	10.16
Dry weight:	1.39	0.93	1.02	0.76	1.07	1.01	1.11	1.28	1.25	1.27	1.71	1.04	0.89	1.03	0.92	0.99
Dry:Wet Weight Ratio:	0.123	0.092	0.095	0.086	0.100	0.100	0.100	0.114	0.116	0.117	0.163	0.100	0.083	0.096	0.088	0.096
Anthracene	0.72	0.56	0.43	0.42	0.45	0.50	0.37	0.98	0.71	0.79	1.33	0.34	0.42	0.56	0.38	0.67
Benzofluoranthene	4.6	1.4	1.3	1.9	2.6	2.4	2.7	2.6	2.2	2.0	6.1	1.7	2.4	2.6	2.1	3.3
Benzotriazole	17.6	23.1	33.2	16.6	21.9	27.9	25.1	38.8	38.0	48.6	23.5	8.7	23.1	27.5	18.0	22.8
Benzotriazole, chlorinated	2.4	2.7	4.0	2.5	2.8	3.7	3.3	5.6	5.9	6.6	2.7	1.5	3.0	3.5	2.5	3.0
Benzo(a)anthracene	3.4	0.8	0.7	0.8	1.4	1.3	1.3	1.9	1.7	1.8	5.7	1.5	1.1	1.1	1.1	2.1
Benzo(a)pyrene	0.44	0.40	0.28	0.55	0.66	0.57	0.68	0.59	0.52	0.47	0.30	0.31	0.66	0.70	0.50	0.87
Benzo(e)pyrene	1.2	0.9	1.0	1.1	1.5	1.5	1.6	1.4	1.2	1.0	1.4	1.2	1.7	1.5	1.3	2.0
Benzo(ghi)perylene	0.73	0.39	0.37	0.59	0.57	0.47	0.67	0.40	0.35	0.26	0.78	0.38	0.18	0.25	0.21	0.23
Chrysene & Triphenylene	3.9	1.8	2.0	1.9	2.6	2.7	2.7	3.7	3.4	2.8	6.5	2.9	2.6	2.4	2.4	4.1
Coronene	0.23	0.13	0.12	0.15	0.12	0.13	0.12	0.12	0.12	0.12	0.52	0.10	0.12	0.25	0.13	0.23
Dibenzo(a,h)anthracene	0.22	0.13	0.12	0.31	0.20	0.15	0.23	0.18	0.16	0.13	0.30	0.06	0.49	0.57	0.40	0.55
Fluoranthene	26.3	11.9	11.0	8.2	9.4	10.5	10.7	14.3	13.0	13.8	40.8	22.6	12.5	14.7	11.2	18.3
Fluorene	0.58	0.36	0.33	0.37	0.48	0.55	0.38	1.08	0.85	0.91	0.84	0.38	0.60	0.79	0.48	0.80
Indeno(1,2,3-cd)pyrene	0.62	0.29	0.23	0.47	0.47	0.39	0.53	0.34	0.30	0.23	0.58	0.21	0.46	0.57	0.40	0.55
MW=178, C1-homologs	3.8	3.4	2.5	2.3	4.1	4.0	4.3	2.9	2.4	2.5	5.4	2.5	2.9	3.5	2.6	4.8
MW=178, C2-homologs	7.9	4.5	3.9	3.0	7.4	8.3	9.3	2.7	2.6	2.5	13.8	6.2	3.9	4.8	3.8	8.8
MW=178, C3-homologs	4.5	3.3	2.7	2.3	4.4	4.7	4.7	1.8	1.8	1.8	13.1	3.7	3.0	4.0	2.6	5.1
MW=178, C4-homologs	1.7	0.7	0.5	0.5	0.8	0.2	0.8	0.9	0.8	0.7	4.1	1.1	1.1	1.0	0.7	1.4
MW=228		3.0	3.0	2.9	4.5	4.4	4.5	6.0	5.5	5.0			3.9	4.1	3.8	6.9
MW=252																
MW=276	2.7	0.8	0.7	1.2	1.4	1.0	1.5	0.9	0.8	0.7	2.6	0.7	0.7	0.8	0.6	0.7
MW=278	0.91	0.24	0.17	0.44	0.51	0.41	0.60	0.74	0.76	0.72	2.22	0.39	1.49	1.62	1.20	1.53

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]	Clam[a]
Sampling Station:	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH3	AH5	AH7	AH7	AH7	AH7
Area :	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor
Sample No.:	798058	798458	798459	798460	798648	798649	798650	798848	798849	798850	798057	798062	798449	798450	798451	798639
Date:	11/09/88	04/26/90	04/26/90	04/26/90	06/19/90	06/19/90	06/19/90	09/18/90	09/18/90	09/18/90	11/09/88	11/09/88	04/26/90	04/26/90	04/26/90	06/19/90
Phase:	I	II	II	II	II	II	II	II	II	II	I	I	II	II	II	II
MW=302	1.5	0.1	0.1	0.1	0.3	0.1	0.4	0.1	0.1	0.1	1.4	0.3	0.4	0.6	0.5	0.6
Perylene	0.29	0.28	0.33	0.40	0.33	0.30	0.31	0.32	0.28	0.24	0.66	0.27	0.91	0.51	0.38	0.38
Phenanthrene	1.9	1.9	1.8	1.5	1.1	1.1	1.2	2.7	2.4	2.5	2.2	1.0	2.2	2.4	2.0	2.0
Pyrene	18.8	9.7	9.4	7.1	9.6	11.0	10.8	13.1	11.7	12.3	28.4	16.2	11.6	13.2	9.2	18.8
PAHs (total parent)	69.7										104.8	51.1				
PESTICIDES (ug/kg)																
Chemistry ID No.:	10317										10316	11323				
Replicate:	A										A	A				
Wet weight:	11.21	10.01	10.62	8.75	10.73	10.14	11.11	11.10	10.68	10.75	10.42	10.26	10.56	10.58	10.30	10.16
Dry weight:	1.39	0.93	1.02	0.76	1.07	1.01	1.11	1.28	1.25	1.27	1.71	1.04	0.89	1.03	0.92	0.99
Dry:Wet Weight Ratio:	0.123	0.092	0.095	0.086	0.100	0.100	0.100	0.114	0.116	0.117	0.163	0.100	0.083	0.096	0.088	0.096
BHC, alpha-	0.039	0.061	0.062	0.063	0.080	0.070	0.064	0.079	0.066	0.071	0.042	0.042	0.053	0.058	0.061	0.080
BHC, gamma-	0.039	0.069	0.061	0.063	0.043	0.084	0.054	0.128	0.102	0.110	0.042	0.042	0.065	0.065	0.068	0.068
Chlordane, alpha-	0.215	0.247	0.222	0.210	0.249	0.277	0.273	0.266	0.246	0.270	0.417	0.042	0.191	0.224	0.196	0.335
Chlordane, gamma-	0.351	0.185	0.167	0.157	0.171	0.216	0.244	0.214	0.203	0.222	0.536	0.042	0.159	0.171	0.164	0.304
DDD, p,p'-	0.466	0.256	0.240	0.210	0.389	0.389	0.380	0.408	0.382	0.395	0.349	0.042	0.212	0.283	0.191	0.505
DDE, p,p'-	0.618	0.058	0.109	0.065	0.083	0.127	0.151	0.793	0.657	0.746	0.955	0.316	0.040	0.066	0.027	0.172
DDT, p,p'-	0.039	0.034	0.034	0.047	0.334	0.143	0.170	0.139	0.186	0.149	0.249	0.042	0.086	1.133	0.347	0.252
Hexachlorobenzene	0.082	0.049	0.056	0.049	0.100	0.120	0.106	0.125	0.097	0.098	0.129	0.066	0.046	0.045	0.046	0.097
PCBs (ug/kg)																
Chemistry ID No.:	10317										10316	11323				
Replicate:	A										A	A				
Wet weight:	11.21	10.01	10.62	8.75	10.73	10.14	11.11	11.10	10.68	10.75	10.42	10.26	10.56	10.58	10.30	10.16
Dry weight:	1.39	0.93	1.02	0.76	1.07	1.01	1.11	1.28	1.25	1.27	1.71	1.04	0.89	1.03	0.92	0.99
Dry:Wet Weight Ratio:	0.123	0.092	0.095	0.086	0.100	0.100	0.100	0.114	0.116	0.117	0.163	0.100	0.083	0.096	0.088	0.096
Aroclor-1242	0.80	0.89	0.29	1.01	1.34	0.97	1.48	0.12	0.84	0.83	0.86	0.87	0.21	0.84	0.87	2.26
Aroclor-1254	18.3	20.1	25.2	17.6	50.0	55.5	57.5	91.4	72.7	78.7	33.3	37.6	16.5	17.6	16.0	48.0
Aroclor-1242/54	18.3	20.1	25.5	17.6	51.4	56.5	59.0	91.5	72.7	78.7	33.3	37.6	16.7	17.6	16.0	50.3

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Mussel [a]	Mussel [a]
Sampling Station:	AH7	AH7	AH7	AH7	AH7	AH8	AH10	AH12	AH13	AH13	AH14	AH	FDA	FDA	AH2	AH2
Area:	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Near-site	Harbor	Harbor	Harbor	Harbor
Sample No.:	798640	798641	798844	798845	798846	798056	798063	798049	798047	798047	798048	798918	798100	798100	798311	798312
Date:	06/19/90	06/19/90	09/18/90	09/18/90	09/18/90	11/09/88	11/09/88	12/23/88	12/21/88	12/21/88	12/23/88		01/04/89	01/04/89	04/30/90	04/30/90
Phase:	II	II	II	II	II	I	I	I	I	I	I	III	I	I	II	II
INORGANICS (mg/kg)																
Chemistry ID No.:	18349	18351	18361	18362	18363	11588	11590	11819	11249	11249	11818	19160	11252	11252	17824	17825
Replicate:	1	1	1		1	1	1	1	Averaged	4	1		1	Averaged	1	1
Wet weight:	14.99	15.16	15.46	14.86	15.14	15.94	15.60	15.05	16.22	16.01	15.14	15.00	16.36	16.73	15.71	15.04
Dry weight:	1.53	1.58	1.83	1.73	1.83	1.80	2.06	1.79	1.32	1.30	1.90	1.08	1.77	1.80	3.31	3.31
Dry:Wet Weight Ratio:	0.102	0.104	0.118	0.120	0.121	0.113	0.132	0.119	0.081	0.081	0.125	0.070	0.108	0.108	0.211	0.220
Arsenic	0.44	0.46	0.52	0.58	0.52	0.68	0.62	0.64		0.41	0.51	0.86		0.49	0.31	0.39
Cadmium	0.100	0.102	0.036	0.040	0.036	0.113	0.080	0.060		0.047	0.046	0.043		0.046	0.182	0.203
Chromium	0.077	0.069	0.012	0.011	0.025	0.075	0.025	0.349		0.031	0.256	0.260		0.075	0.177	0.191
Copper	2.2	2.9	1.9	1.4	2.5	3.3	2.5	6.0		1.1	2.9	2.5		1.7	1.9	2.2
Iron	28.8	25.8	25.8	29.3	41.1	32.6	21.7	578.3		29.5	302.6	1309.0		34.3	70.5	74.8
Lead	0.11	0.16	0.14	0.10	0.16	0.15	0.20	1.49		0.06	0.34	4.30		0.07	0.61	0.57
Manganese	2.5	2.6	4.6	4.6	7.6	4.9	7.6	3.2		0.4	1.7	1.8		0.8	4.3	4.9
Mercury									0.0070				0.0081			
Nickel	1.32	1.14	1.06	1.02	1.06	1.31	0.90	0.69		0.16	0.40	0.14		0.24	0.42	0.38
Silver						0.09	0.13	0.13		0.16	0.20			0.15		
Zinc	11.5	12.8	12.6	12.8	14.9	14.4	17.4	20.6		6.5	12.6	6.8		9.3	14.5	14.8
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:						11322	11324	11800	11244		11799		11247			
Replicate:						A	A	A	A		A		A			
Wet weight:	10.73	12.16	12.85	11.31	10.42	10.32	10.12	10.15	11.00		13.21	11.20	10.87		10.65	10.15
Dry weight:	1.12	1.18	1.44	1.28	1.28	1.10	1.34	1.15	0.92		1.65	1.51	1.20		2.06	2.05
Dry:Wet Weight Ratio:	0.104	0.096	0.111	0.112	0.122	0.106	0.131	0.112	0.084		0.124	0.133	0.109		0.192	0.201
Anthracene	0.63	0.82	0.73	0.76	0.23	0.54	0.61	0.76	0.40		1.04	0.11	1.33		2.09	2.07
Benzofluoranthene	3.8	3.0	2.6	2.3	1.2	5.1	3.7	6.7	3.2		6.1	12.1	7.6		2.8	4.1
Benzotriazole	26.3	29.0	35.4	45.6	81.5	5.5	9.7	7.0	13.1		23.9	4.8	25.4		59.3	83.6
Benzotriazole, chlorinated	4.0	4.0	5.1	6.4	8.4	1.4	2.2	1.5	1.8		3.6	1.9	2.4		5.5	7.1
Benzo(a)anthracene	1.7	2.1	1.7	1.8	0.4	4.2	3.3	5.0	1.6		7.8	3.5	6.2		0.9	1.4
Benzo(a)pyrene	1.05	0.93	0.59	0.49	0.28	0.89	0.62	1.56	1.08		0.85	4.44	1.28		0.44	0.63
Benzo(e)pyrene	2.3	1.6	1.4	1.3	0.7	2.5	2.5	5.3	2.7		4.8	7.1	5.8		3.3	4.6
Benzo(ghi)perylene	0.21	0.26	0.16	0.13	0.12	0.97	0.78	2.46	1.37		1.92	4.30	3.06		0.41	0.64
Chrysene & Triphenylene	4.2	4.7	2.8	3.3	0.9	5.1	5.3	8.2	2.8		8.1	6.3	8.7		5.4	7.8
Coronene	0.21	0.28	0.10	0.11	0.12	0.22	0.20	0.28	0.24		0.22	0.11	0.41		0.12	0.13
Dibenzo(a,h)anthracene	0.63	0.58	0.35	0.27	0.20	0.22	0.13	0.52	0.20		1.28	0.90	0.45		0.12	0.25
Fluoranthene	15.6	12.7	13.2	15.2	1.7	32.5	36.2	32.0	10.4		32.9	9.1	30.2		62.6	62.7
Fluorene	1.05	1.12	0.75	0.86	0.27	0.49	0.40	0.54	0.35		1.44	0.11	1.33		3.00	3.26
Indeno(1,2,3-cd)pyrene	0.63	0.58	0.35	0.23	0.20	0.83	0.52	1.42	0.69		1.02	2.62	1.07		0.28	0.44
MW=178, C1-homologs	5.0	4.5	2.4	2.8	0.8	3.0	4.9	5.3	2.3		6.8	2.6	19.4		12.7	13.1
MW=178, C2-homologs	8.6	7.0	2.6	2.7	0.8	5.7	12.0	8.2	4.2		10.0	3.9	43.3		15.5	15.7
MW=178, C3-homologs	4.6	3.7	1.5	1.9	0.6	4.0	8.2	5.9	3.8		6.3	1.7	37.4		10.1	11.4
MW=178, C4-homologs	1.1	0.8	0.7	0.8	0.3	1.2	2.8	2.0	1.4		2.6	0.1	12.3		1.6	1.6
MW=228	6.5	7.4	5.0	5.6	1.4							10.6			7.0	11.5
MW=252																
MW=276	0.1	0.8	0.5	0.3	0.3	2.6	1.7	4.9	2.8		3.7	7.0	6.5		0.9	1.3
MW=278	2.10	1.67	0.97	0.75	0.60	1.10	0.61	1.71	1.05		0.00	0.96	2.33		0.50	1.68

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Mussel [c]	Mussel [c]
Sampling Station:	AH7	AH7	AH7	AH7	AH7	AH8	AH10	AH12	AH13	AH13	AH14	AH	FDA	FDA	AH2	AH2
Area :	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Near-site	Harbor	Harbor	Harbor	Harbor
Sample No.:	798640	798641	798844	798845	798846	798056	798063	798049	798047	798047	798048	798918	798100	798100	798311	798312
Date:	06/19/90	06/19/90	09/18/90	09/18/90	09/18/90	11/09/88	11/09/88	12/23/88	12/21/88	12/21/88	12/23/88		01/04/89	01/04/89	04/30/90	04/30/90
Phase:	II	II	II	II	II	I	I	I	I	I	I	III	I	I	II	II
MW=302	0.8	0.7	0.8	0.8	0.6	1.0	0.7	1.7	0.2		0.9	0.1	1.0		0.1	0.1
Perylene	0.42	0.33	0.32	0.22	0.16	0.33	0.55	1.49	0.64		0.45	2.27	0.75		0.44	0.66
Phenanthrene	2.3	2.5	2.3	2.3	0.5	2.9	2.3	4.9	1.6		7.1	3.1	7.7		10.0	11.6
Pyrene	17.5	12.1	11.5	13.2	2.0	28.0	27.1	22.3	8.7		27.0	9.7	23.9		23.8	23.7
PAHs (total parent)						89.7	87.4	99.3	39.1		104.5		108.8			
PESTICIDES (ug/kg)																
Chemistry ID No.:						11322	11324	11800			11799					
Replicate:						A	A	A			A					
Wet weight:	10.73	12.16	12.85	11.31	10.42	10.32	10.12	10.15			13.21	11.20			10.65	10.15
Dry weight:	1.12	1.18	1.44	1.28	1.28	1.10	1.34	1.15			1.65	1.51			2.06	2.05
Dry:Wet Weight Ratio:	0.104	0.096	0.111	0.112	0.122	0.106	0.131	0.112			0.124	0.143			0.192	0.201
BHC, alpha-	0.075	0.074	0.063	0.064	0.076	0.042	0.043	0.058			0.072	0.066			0.300	0.291
BHC, gamma-	0.069	0.069	0.081	0.090	0.102	0.042	0.043	0.036			0.038	0.041			0.413	0.555
Chlordane, alpha-	0.324	0.300	0.228	0.251	0.261	0.042	0.043	0.043			0.124	0.104			1.513	1.566
Chlordane, gamma-	0.280	0.260	0.167	0.193	0.226	0.188	0.195	0.200			0.260	0.163			1.507	1.546
DDD, p,p'-	0.415	0.418	0.301	0.314	0.414	0.042	0.043	4.312			6.969	0.312			2.554	2.553
DDE, p,p'-	0.178	0.110	0.573	0.511	0.494	0.042	0.043	0.463			0.298	0.193			1.561	0.593
DDT, p,p'-	0.147	0.169	0.103	0.148	0.250	0.042	0.043	0.043			0.185	0.176			0.436	0.529
Hexachlorobenzene	0.112	0.090	0.092	0.083	0.086	0.042	0.043	0.064			0.059	0.147			0.105	0.124
PCBs (ug/kg)																
Chemistry ID No.:						11322	11324	11800	11244		11799		11247			
Replicate:						A	A	A	A		A		A			
Wet weight:	10.73	12.16	12.85	11.31	10.42	10.32	10.12	10.15	11.00		13.21	11.20	10.87		10.65	10.15
Dry weight:	1.12	1.18	1.44	1.28	1.28	1.10	1.34	1.15	0.92		1.65	1.51	1.20		2.06	2.05
Dry:Wet Weight Ratio:	0.104	0.096	0.111	0.112	0.122	0.106	0.131	0.112	0.084		0.124	0.143	0.109		0.192	0.201
Aroclor-1242	1.77	1.65	0.69	0.79	0.86	0.86	0.88	1.53	0.82		2.31	0.85	0.82		8.28	7.04
Aroclor-1254	55.0	44.7	51.7	47.2	48.1	26.4	30.8	109.2	12.6		63.4	32.3	27.0		145.7	144.5
Aroclor-1242/54	56.8	46.4	51.7	47.2	48.1	26.4	30.8	110.8	12.6		65.7	32.9	27.0		154.0	151.6

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *
Sampling Station:	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH6	AH6	AH7	AH7	AH7	AH7	AH7	AH7	AH7
Area :	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor
Sample No.:	798313	798540	798541	798542	798567	798568	798569	798146	798148	798299	798300	798301	798527	798528	798529	798554
Date:	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90	10/11/90	10/11/90	06/06/89	06/06/89	04/30/90	04/30/90	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90
Phase:	II	II	II	II	II	II	II	I	I	II	II	II	II	II	II	II
INORGANICS (mg/kg)																
Chemistry ID No.:	17826	17836	17837	17838	18123	18124	18125	11823	11824	17827	17828	17829	17839	17840	17841	18126
Replicate:	1	1	1	1	1	1	1	1	Averaged		1	1	1	1	1	
Wet weight:	15.10	15.52	15.62	15.72	16.99	16.44	15.18	15.00	15.00	15.71	15.07	15.58	15.47	15.60	15.36	17.15
Dry weight:	3.31	2.59	2.14	2.85	2.24	2.02	2.24	2.82	2.83	3.22	3.03	3.19	2.42	2.56	2.54	2.34
Dry:Wet Weight Ratio:	0.219	0.167	0.137	0.181	0.132	0.123	0.148	0.188	0.189	0.205	0.201	0.205	0.156	0.164	0.165	0.136
Arsenic	0.35	0.32	0.33	0.30	0.43	0.43	0.46	0.64	0.59	0.31	0.32	0.31	0.49	0.50	0.48	0.43
Cadmium	0.189	0.087	0.118	0.095	0.091	0.079	0.083	0.203	0.229	0.165	0.172	0.157	0.113	0.099	0.101	0.072
Chromium	0.191	0.139	0.149	0.168	0.111	0.103	0.108	0.135	0.453	0.141	0.155	0.182	0.158	0.230	0.216	0.092
Copper	1.9	1.0	1.0	1.1	0.5	0.5	0.6	2.0	2.0	1.8	1.7	2.1	0.8	0.9	0.9	0.6
Iron	75.6	71.5	94.7	80.4	35.9	44.3	53.0	60.6	57.2	61.1	67.9	78.1	82.7	112.0	130.0	40.5
Lead	0.60	0.47	0.52	0.47	0.34	0.31	0.37	0.55	0.60	0.50	0.52	0.49	0.46	0.56	0.60	0.25
Manganese	4.6	9.2	11.9	11.2	2.0	2.5	3.0	3.2	3.4	3.8	4.3	4.5	7.1	9.0	9.1	2.4
Mercury																
Nickel	0.33	0.23	0.28	0.27	0.12	0.14	0.12	0.40	0.83	0.32	0.31	0.36	0.24	0.28	0.29	0.09
Silver								0.03	0.03							
Zinc	15.7	11.2	11.9	11.9	6.0	5.6	7.5	18.1	22.8	14.9	14.3	14.1	11.4	11.4	12.5	5.9
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:								11767	11768							
Replicate:								A	A							
Wet weight:	10.29	10.76	10.23	10.89	10.64	10.18	10.26	10.23	9.75	11.11	11.22	11.16	10.47	10.68	11.13	10.40
Dry weight:	2.12	1.63	1.69	1.79	1.35	1.21	1.31	1.72	1.70	2.20	2.11	2.12	1.54	1.64	1.75	1.30
Dry:Wet Weight Ratio:	0.205	0.150	0.164	0.163	0.127	0.119	0.128	0.167	0.173	0.197	0.187	0.189	0.146	0.153	0.156	0.125
Anthracene	2.23	1.46	1.06	1.51	0.85	0.83	1.21	1.48	1.20	2.78	2.86	2.93	1.87	1.64	1.70	1.20
Benzofluoranthene	4.1	5.5	3.9	4.7	5.4	6.0	8.3	6.9	8.0	5.8	5.2	7.7	6.8	6.8	5.8	8.2
Benzotriazole	91.0	41.6	37.7	34.6	25.0	23.3	28.0	52.4	52.9	108.5	102.9	100.2	50.2	49.3	45.6	21.3
Benzotriazole, chlorinated	8.0	4.1	3.4	3.5	3.1	3.2	3.4	8.1	7.2	18.5	14.2	9.7	5.4	5.0	4.2	2.8
Benzo(a)anthracene	1.2	2.3	1.3	2.0	3.3	3.9	5.2	4.9	5.8	2.2	2.4	2.5	2.8	3.0	2.5	6.1
Benzo(a)pyrene	0.66	0.81	0.68	0.68	0.53	0.61	0.94	0.58	0.69	0.76	0.83	0.82	1.04	1.14	1.02	0.82
Benzo(e)pyrene	4.6	4.7	3.6	4.6	5.1	4.8	6.2	7.4	7.2	5.8	5.9	5.5	6.3	6.0	4.8	6.0
Benzo(ghi)perylene	0.58	0.93	1.06	0.97	0.84	0.78	1.00	1.82	1.78	0.73	0.70	0.69	1.33	1.27	1.11	0.76
Chrysene & Triphenylene	8.0	6.1	4.7	6.2	7.6	7.5	10.2	10.9	10.2	9.9	9.6	10.1	7.8	7.4	6.6	11.7
Coronene	0.13	0.12	0.20	0.10	0.16	0.13	0.15	0.38	0.45	0.15	0.23	0.12	0.19	0.12	0.15	0.13
Dibenzo(a,h)anthracene	0.26	0.23	0.29	0.24	0.26	0.26	0.37	0.29	0.30	0.30	0.16	0.19	0.45	0.44	0.42	0.24
Fluoranthene	64.8	29.7	24.4	32.1	40.5	35.5	51.8	53.8	88.7	84.5	83.0	88.1	39.7	35.6	33.7	56.1
Fluorene	3.18	1.36	1.22	1.70	0.55	0.44	0.79	1.77	1.57	3.68	3.63	3.31	1.71	1.35	1.27	0.67
Indeno(1,2,3-cd)pyrene	0.41	0.60	0.63	0.58	0.50	0.52	0.66	0.97	1.08	0.46	0.58	0.50	0.85	0.94	0.79	0.52
MW=178, C1-homologs	13.1	5.1	4.5	5.9	4.0	3.7	6.0	7.1	6.5	15.1	13.5	16.9	5.9	5.3	5.2	5.6
MW=178, C2-homologs	15.5	7.5	6.2	8.5	8.6	7.7	11.5	12.5	11.1	16.1	15.9	18.4	8.6	8.0	7.1	11.5
MW=178, C3-homologs	10.2	6.5	4.8	6.7	8.5	7.7	11.3	9.5	8.6	10.7	10.8	12.2	7.2	7.0	6.2	10.9
MW=178, C4-homologs	1.7	2.0	1.3	1.9	2.8	2.8	4.0	4.0	3.6	2.1	2.4	2.3	2.6	2.4	2.3	4.2
MW=228	11.3	9.7	7.2	9.7	12.6	13.0	17.7			14.4	14.3	15.4	12.6	12.1	10.7	20.0
MW=252																
MW=276	1.4	1.8	2.1	1.9	1.6	1.6	2.0	4.0	4.3	1.6	1.9	1.7	2.8	2.7	2.4	1.6
MW=278	1.66	0.56	0.65	0.54	0.67	0.64	0.89	1.39	1.73	1.87	1.51	1.73	1.13	1.11	0.99	0.61

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]
Sampling Station:	AH2	AH2	AH2	AH2	AH2	AH2	AH2	AH6	AH6	AH7	AH7	AH7	AH7	AH7	AH7	AH7
Area:	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor	Harbor
Sample No.:	798313	798540	798541	798542	798567	798568	798569	798146	798148	798299	798300	798301	798527	798528	798529	798554
Date:	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90	10/11/90	10/11/90	06/06/89	06/06/89	04/30/90	04/30/90	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90
Phase:	II	II	II	II	II	II	II	I	I	II	II	II	II	II	II	II
MW=302	0.1	0.1	0.3	0.1	0.1	0.2	0.2	1.5	1.6	0.1	0.1	0.2	0.2	0.4	0.6	0.1
Perylene	0.64	0.76	0.64	0.92	0.70	0.73	1.37	0.65	0.90	0.85	0.84	0.72	1.06	1.10	1.05	0.83
Phenanthrene	11.2	2.4	2.1	2.8	1.2	0.9	1.5	4.2	4.0	13.2	11.4	13.2	3.3	3.1	3.1	1.7
Pyrene	23.2	25.5	19.8	26.7	31.6	28.8	42.1	61.3	55.5	36.4	37.6	42.1	35.8	31.5	30.9	47.9
PAHs (total parent)								166.3	197.2							
PESTICIDES (ug/kg)																
Chemistry ID No.:								11767	11768							
Replicate:								A	A							
Wet weight:	10.29	10.76	10.23	10.89	10.64	10.18	10.26	10.23	9.75	11.11	11.22	11.16	10.47	10.68	11.13	10.40
Dry weight:	2.12	1.63	1.69	1.79	1.35	1.21	1.31	1.72	1.70	2.20	2.11	2.12	1.54	1.64	1.75	1.30
Dry:Wet Weight Ratio:	0.205	0.150	0.164	0.163	0.127	0.119	0.128	0.167	0.173	0.197	0.187	0.189	0.146	0.153	0.156	0.125
BHC, alpha-	0.293	0.198	0.226	0.262	0.081	0.067	0.096	0.247	0.204	0.296	0.294	0.274	0.119	0.126	0.108	0.083
BHC, gamma-	0.508	0.146	0.157	0.186	0.106	0.094	0.106	0.098	0.116	0.467	0.424	0.378	0.111	0.105	0.105	0.104
Chlordane, alpha-	1.650	0.935	0.874	1.012	0.457	0.389	0.527	0.043	1.481	1.582	1.584	1.612	0.892	0.886	0.847	0.435
Chlordane, gamma-	1.593	0.798	0.768	0.879	0.423	0.358	0.466	1.770	1.647	1.533	1.462	1.525	0.736	0.744	0.696	0.408
DDD, p,p'-	2.645	1.800	1.689	2.021	0.952	0.829	1.197	2.789	2.872	2.541	2.487	2.854	1.390	1.441	1.418	0.991
DDE, p,p'-	1.037	1.053	0.561	0.694	0.672	0.515	1.139	2.708	2.279	1.204	1.273	1.678	0.746	1.342	1.094	0.805
DDT, p,p'-	0.457	0.188	0.195	0.238	0.087	0.063	0.146	0.628	0.585	0.494	0.417	0.438	0.140	0.123	0.110	0.163
Hexachlorobenzene	0.109	0.076	0.077	0.083	0.049	0.065	0.063	0.122	0.146	0.116	0.099	0.095	0.057	0.075	0.075	0.056
PCBs (ug/kg)																
Chemistry ID No.:								11767	11768							
Replicate:								A	A							
Wet weight:	10.29	10.76	10.23	10.89	10.64	10.18	10.26	10.23	9.75	11.11	11.22	11.16	10.47	10.68	11.13	10.40
Dry weight:	2.12	1.63	1.69	1.79	1.35	1.21	1.31	1.72	1.70	2.20	2.11	2.12	1.54	1.64	1.75	1.30
Dry:Wet Weight Ratio:	0.205	0.150	0.164	0.163	0.127	0.119	0.128	0.167	0.173	0.197	0.187	0.189	0.146	0.153	0.156	0.125
Aroclor-1242	8.02	5.58	5.10	6.63	2.34	1.22	2.18	9.05	9.64	7.78	7.52	7.41	3.50	5.60	5.52	2.60
Aroclor-1254	156.6	114.9	113.5	128.3	103.0	85.1	102.5	195.4	168.3	148.1	143.6	133.8	96.5	126.5	117.8	90.0
Aroclor-1242/54	164.6	120.5	118.6	135.0	105.3	86.3	104.7	203.7	178.2	155.8	151.1	141.2	100.0	132.2	123.4	92.5

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Mussel [a]	Mussel [a]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]
Sampling Station:	AH7	AH7	LANDM	LANDM	LANDM	LANDN	LANDN	LANDN	LANDS	LANDS	LANDS	NC	NC	NC	SN	SN
Area:	Harbor	Harbor	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Harbor	Harbor	Harbor	Harbor	Harbor
Sample No.:	798555	798556	798392	798699	798786	798398	798698	798785	798404	798700	798787	798411	798714	798799	798415	798716
Date:	10/11/90	10/11/90	04/19/90	06/21/90	09/16/90	04/19/90	06/21/90	09/16/90	04/20/90	06/21/90	09/16/90	04/20/90	07/04/90	09/16/90	04/20/90	07/04/90
Phase:	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II
INORGANICS (mg/kg)																
Chemistry ID No.:	18127	18128		18166	18172	18161	18167	18173	18162	18168	18174	18163	18169	18175	18164	18170
Replicate:	1	1		1	1	1	1	1	1	1	1		1	1	1	1
Wet weight:	16.33	19.71	0.00	15.35	16.91	15.07	17.30	15.64	16.72	17.61	15.10	16.70	15.29	18.46	15.11	16.01
Dry weight:	2.09	2.27	0.00	1.72	1.75	2.08	2.11	1.98	1.71	1.67	1.16	1.56	1.51	1.67	1.47	1.76
Dry:Wet Weight Ratio:	0.128	0.115	0.000	0.112	0.103	0.138	0.122	0.127	0.102	0.095	0.077	0.094	0.099	0.090	0.097	0.110
Arsenic	0.40	0.34		0.50	0.43	0.46	0.39	0.43	0.46	0.34	0.39	0.36	0.36	0.38	0.25	0.37
Cadmium	0.070	0.063		0.505	0.371	0.129	0.119	0.122	0.138	0.151	0.166	0.084	0.079	0.081	0.056	0.078
Chromium	0.086	0.085		1.770	0.232	9.053	0.156	0.169	3.019	0.067	0.199	0.658	0.013	0.094	1.077	0.062
Copper	0.5	0.5		48.0	3.7	2.6	2.3	2.5	3.0	1.5	1.5	1.9	1.0	0.9	3.5	1.7
Iron	39.7	41.4		834.4	411.0	234.6	107.2	218.4	582.4	142.5	504.4	108.1	58.0	59.2	130.0	56.9
Lead	0.33	0.24		3.12	0.59	0.91	0.41	0.73	1.20	0.42	1.07	0.17	0.11	0.13	2.34	0.45
Manganese	2.5	2.0		4.2	2.5	7.1	3.7	4.5	2.8	1.0	1.7	4.3	2.0	3.1	2.1	0.9
Mercury																
Nickel	0.11	0.07		0.83	0.13	11.43	0.22	0.28	2.71	0.15	0.19	0.55	0.04	0.06	1.47	0.06
Silver																
Zinc	6.6	5.6		14.0	4.4	11.7	8.0	10.0	7.6	5.9	3.6	4.2	4.1	3.1	13.1	4.9
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:																
Replicate:																
Wet weight:	11.17	11.04	10.09	11.38	12.40	10.02	12.70	11.61	10.77	15.26	10.33	10.50	10.54	11.05	15.68	10.06
Dry weight:	1.32	1.16	1.03	1.23	1.23	1.33	1.52	1.06	1.13	1.31	0.74	0.97	0.97	0.95	1.49	1.07
Dry:Wet Weight Ratio:	0.117	0.104	0.101	0.107	0.098	0.132	0.120	0.091	0.104	0.085	0.071	0.092	0.091	0.085	0.094	0.105
Anthracene	1.10	0.91	4.73	2.40	3.24	3.37	1.84	1.11	2.57	2.22	1.39	4.18	1.67	1.92	13.63	4.23
Benzofluoranthene	8.4	7.9	8.5	2.9	7.5	3.8	1.6	1.1	3.7	2.7	20.1	3.4	0.8	1.4	75.0	12.0
Benzotriazole	22.9	20.2	18.9	16.2	14.1	27.1	18.5	11.5	12.8	15.1	5.8	10.7	9.9	8.7	11.6	19.3
Benzotriazole, chlorinated	3.1	2.7	3.8	2.5	2.5	4.0	2.6	1.8	2.7	2.5	1.1	2.0	1.8	1.6	2.2	3.2
Benzo(a)anthracene	5.8	4.8	8.2	3.2	4.9	4.5	1.6	0.6	4.0	1.4	2.1	4.1	0.9	1.0	43.4	6.8
Benzo(a)pyrene	0.92	0.96	1.64	0.77	2.56	0.20	0.21	0.21	0.60	0.69	8.52	0.12	0.12	0.19	26.70	2.16
Benzo(e)pyrene	6.0	5.5	5.9	2.2	3.7	3.6	2.0	1.1	3.0	2.3	10.9	2.5	1.2	1.1	33.2	8.1
Benzo(ghi)perylene	0.90	0.89	1.27	0.60	1.77	0.54	0.50	0.45	0.58	0.76	5.85	0.12	0.24	0.28	11.56	1.82
Chrysene & Triphenylene	10.9	8.9	9.6	5.0	5.6	8.0	4.3	1.7	6.3	2.7	7.5	5.6	2.4	1.8	72.5	21.1
Coronene	0.11	0.12	0.13	0.11	0.21	0.13	0.10	0.11	0.12	0.08	0.73	0.12	0.12	0.12	1.65	0.20
Dibenzo(a,h)anthracene	0.31	0.32	0.39	0.21	0.77	0.13	0.15	0.18	0.12	0.12	2.79	0.12	0.12	0.12	4.98	0.46
Fluoranthene	50.5	39.5	67.7	25.7	31.6	83.6	30.5	12.9	41.4	14.2	10.2	64.3	16.7	15.6	157.9	62.1
Fluorene	0.52	0.54	14.44	6.56	9.70	16.37	9.37	4.32	10.82	5.15	3.50	13.16	7.27	6.72	19.18	9.16
Indeno(1,2,3-cd)pyrene	0.62	0.66	0.79	0.39	1.48	0.17	0.21	0.21	0.28	0.40	5.25	0.12	0.12	0.10	11.47	1.14
MW=178, C1-homologs	4.7	3.9	23.1	11.2	7.6	23.8	14.2	3.8	17.0	7.5	3.5	15.3	7.8	5.1	100.6	28.6
MW=178, C2-homologs	10.0	7.8	27.1	16.3	5.6	28.0	18.4	3.0	18.5	11.2	3.2	16.1	9.7	3.8	71.3	28.9
MW=178, C3-homologs	9.7	8.0	15.9	9.3	3.5	16.8	10.7	2.0	11.6	6.6	2.2	8.8	5.9	2.3	32.3	15.5
MW=178, C4-homologs	4.2	3.7	6.7	3.2	3.4	5.4	2.8	1.3	3.7	3.2	2.1	3.4	2.1	1.6	29.0	9.6
MW=228	19.0	15.6	19.8	9.1	12.1	13.7	6.5	2.6	11.3	4.9	10.4	10.3	3.7	3.2	120.3	29.7
MW=252																
MW=276	1.9	1.9	2.4	1.3	4.1	0.8	1.0	1.0	1.0	1.2	14.1	0.1	0.3	0.4	30.6	3.6
MW=278	0.86	0.82	0.85	0.56	1.90	0.13	0.45	0.42	0.20	0.14	6.87	0.12	0.12	0.13	13.82	1.28

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Mussel [c]	Mussel [c]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]
Sampling Station:	AH7	AH7	LANDM	LANDM	LANDM	LANDN	LANDN	LANDN	LANDS	LANDS	LANDS	NC	NC	NC	SN	SN
Area :	Harbor	Harbor	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Near-site	Harbor	Harbor	Harbor	Harbor	Harbor
Sample No.:	798555	798556	798392	798699	798786	798398	798698	798785	798404	798700	798787	798411	798714	798799	798415	798716
Date:	10/11/90	10/11/90	04/19/90	06/21/90	09/16/90	04/19/90	06/21/90	09/16/90	04/20/90	06/21/90	09/16/90	04/20/90	07/04/90	09/16/90	04/20/90	07/04/90
Phase:	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II
MW=302	0.2	0.1	0.1	0.2	1.3	0.1	0.1	0.1	0.1	0.1	5.9	0.1	0.1	0.1	11.3	0.9
Perylene	0.86	0.90	1.85	0.46	1.01	0.98	0.30	0.27	0.98	0.68	2.88	1.21	0.43	0.73	5.25	0.65
Phenanthrene	1.5	1.3	50.0	38.5	36.1	45.3	29.3	8.9	38.5	19.9	7.9	40.9	30.3	19.1	147.6	75.8
Pyrene	42.4	33.9	61.9	30.0	33.4	78.1	27.6	14.0	38.0	14.8	12.1	55.5	18.1	19.6	160.7	68.0
PAHs (total parent)																
PESTICIDES (ug/kg)																
Chemistry ID No.:																
Replicate:																
Wet weight:	11.17	11.04	10.09	11.38	12.40	10.02	12.70	11.61	10.77	15.26	10.33	10.50	10.54	11.05	15.68	10.06
Dry weight:	1.32	1.16	1.03	1.23	1.23	1.33	1.52	1.06	1.13	1.31	0.74	0.97	0.97	0.95	1.49	1.07
Dry:Wet Weight Ratio:	0.117	0.104	0.101	0.107	0.098	0.132	0.120	0.091	0.104	0.085	0.071	0.092	0.091	0.085	0.094	0.105
BHC, alpha-	0.071	0.063	0.182	0.539	0.070	0.379	1.356	0.066	0.164	0.317	0.038	0.336	0.268	0.071	0.101	0.167
BHC, gamma-	0.095	0.074	0.251	0.155	0.348	0.363	0.242	0.038	0.245	0.155	0.239	0.259	0.129	0.039	0.182	0.067
Chlordane, alpha-	0.411	0.337	0.881	0.857	0.483	1.155	0.925	0.403	1.342	0.663	0.276	0.557	0.545	0.336	1.955	2.919
Chlordane, gamma-	0.374	0.312	0.646	0.692	0.405	0.766	0.670	0.291	1.695	0.553	0.262	0.362	0.408	0.264	1.485	2.310
DDD, p,p'-	0.911	0.730	5.181	7.255	3.949	5.518	4.632	1.756	52.000	3.995	1.576	5.575	4.077	2.933	1.664	1.827
DDE, p,p'-	0.725	0.821	1.515	4.858	3.077	1.571	3.132	1.811	3.255	3.349	1.157	1.242	3.003	1.964	0.235	2.037
DDT, p,p'-	0.126	0.088	0.747	2.696	0.918	0.829	1.172	0.490	1.789	0.808	0.323	0.394	0.508	0.464	0.416	0.552
Hexachlorobenzene	0.049	0.048	0.043	0.059	0.061	0.023	0.042	0.037	0.058	0.058	0.027	0.028	0.035	0.033	0.015	0.028
PCBs (ug/kg)																
Chemistry ID No.:																
Replicate:																
Wet weight:	11.17	11.04	10.09	11.38	12.40	10.02	12.70	11.61	10.77	15.26	10.33	10.50	10.54	11.05	15.68	10.06
Dry weight:	1.32	1.16	1.03	1.23	1.23	1.33	1.52	1.06	1.13	1.31	0.74	0.97	0.97	0.95	1.49	1.07
Dry:Wet Weight Ratio:	0.117	0.104	0.101	0.107	0.098	0.132	0.120	0.091	0.104	0.085	0.071	0.092	0.091	0.085	0.094	0.105
Arodor-1242	2.39	1.64	0.88	4.30	2.89	0.89	3.05	0.11	2.13	0.58	0.86	0.86	0.85	0.80	0.57	0.22
Arodor-1254	85.3	75.8	131.3	190.5	163.7	454.1	506.4	391.3	171.6	159.0	110.1	120.5	202.9	158.1	34.8	89.7
Arodor-1242/54	87.8	77.5	131.3	194.7	166.6	454.1	508.8	391.3	173.7	159.0	110.1	120.5	202.9	158.1	34.8	89.9

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Oyster	Oyster	Oyster	Clam [e]	Clam [e]	Clam [e]	Clam [e]	Clam [e]	Clam [e]	Clam [e]	Clam [e]	Clam [e]
Sampling Station:	SN	WC	WC	WC	LANDM	LANDN	LANDS	GB1	GB2	GB3	GB4	GB5	LAB	LAB	LAB	LAB
Area :	Harbor	Harbor	Harbor	Harbor	Near-site	Near-site	Near-site	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798801	798413	798715	798800	798095	798094	798096	798079	798080	798081	798082	798083	798471	798472	798473	798669
Date:	09/16/90	04/20/90	07/04/90	09/16/90	01/04/89	01/04/89	01/04/89	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	04/27/90	04/27/90	04/27/90	06/20/90
Phase:	II	II	II	II	I	I	I	I	I	I	I	I	II	II	II	II
INORGANICS (mg/kg)																
Chemistry ID No.:	18176	18165	18171	18177	11813	11812	11814	11596	11597	11598	11599	11600	18342	18343	18344	18355
Replicate:	1	1	1	1	1	1	1	1	Averaged	1	1	Averaged	1	1	1	1
Wet weight:	16.85	15.40	15.18	16.66	14.98	15.01	15.01	14.99	14.96	15.51	14.96	15.18	14.89	15.21	15.20	15.27
Dry weight:	1.36	1.04	1.16	1.17	1.99	2.13	1.87	2.11	1.88	2.03	2.04	2.16	1.52	1.47	1.46	1.47
Dry:Wet Weight Ratio:	0.081	0.068	0.076	0.070	0.133	0.142	0.125	0.141	0.126	0.131	0.136	0.142	0.102	0.097	0.096	0.096
Arsenic	0.33	0.26	0.31	0.30	0.36	0.24	0.40	1.13	0.78	1.17	1.16	1.32	0.85	1.09	0.79	1.00
Cadmium	0.096	0.121	0.105	0.111	0.645	0.613	0.361	0.057	0.080	0.090	0.097	0.066	0.101	0.069	0.106	0.013
Chromium	0.256	0.539	0.033	0.012	0.053	0.050	0.036	0.127	0.096	0.096	0.069	0.145	0.462	0.498	0.437	0.101
Copper	3.2	2.7	0.9	0.9	105.5	100.0	46.0	2.3	2.1	2.3	2.3	2.2	1.0	1.0	0.9	1.0
Iron	116.6	64.2	95.0	60.6	113.4	69.7	104.8	10.4	7.4	10.2	8.9	10.1	20.2	14.7	31.5	32.3
Lead	1.90	0.14	0.16	0.13	0.18	0.25	0.11	0.11	0.13	0.09	0.15	0.10	0.29	0.19	0.73	0.08
Manganese	2.1	1.8	1.4	0.8	1.2	1.3	0.8	14.8	13.0	7.8	10.0	9.8	4.2	5.0	8.0	1.7
Mercury																
Nickel	0.49	0.44	0.02	0.03	0.22	0.23	0.44	1.35	1.80	2.20	1.56	1.49	1.67	1.98	1.21	1.30
Silver					0.09	0.71	0.05	0.08	0.10	0.09	0.11	0.12				
Zinc	10.1	3.1	3.3	2.7	539.9	434.4	543.5	18.1	18.2	19.0	19.0	18.3	9.9	10.7	13.2	9.1
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:					11807	11806	11808	11337	11338	11348	11349	11350				
Replicate:					A	A	A	A	A	A	A	A				
Wet weight:	11.92	10.79	12.88	0.68	11.18	10.32	10.05	10.86	9.83	10.73	10.73	10.73	10.60	11.26	11.10	10.68
Dry weight:	0.83	0.60	0.98	0.68	1.46	1.44	1.22	1.32	1.21	1.12	1.12	1.12	0.92	0.95	0.99	1.07
Dry:Wet Weight Ratio:	0.069	0.055	0.075	0.061	0.130	0.139	0.120	0.121	0.122	0.104	0.104	0.104	0.086	0.083	0.088	0.100
Anthracene	7.25	1.25	0.84	0.55	0.96	0.88	0.71	0.14	0.16	0.13	0.12	0.11	0.14	0.10	0.18	0.13
Benzofluoranthene	68.6	2.3	1.1	1.3	2.2	2.9	3.0	1.0	0.8	0.7	0.9	0.8	0.6	0.4	1.2	0.8
Benzotriazole	7.2	3.4	10.4	5.4	1.8	2.1	0.7	36.5	21.5	20.8	36.7	31.2	11.6	11.8	11.4	15.5
Benzotriazole, chlorinated	1.3	0.9	2.3	1.2	0.7	0.7	0.6	6.0	4.0	3.2	5.4	5.3	1.4	1.9	1.4	1.9
Benzo(a)anthracene	30.8	2.0	0.7	0.7	4.3	6.3	7.2	0.5	0.9	0.3	0.7	0.7	0.2	0.2	0.5	0.4
Benzo(a)pyrene	26.36	0.17	0.23	0.23	0.22	0.16	0.15	0.17	0.11	0.15	0.11	0.09	0.12	0.20	0.34	0.25
Benzo(e)pyrene	31.1	2.2	1.3	0.9	1.5	2.3	1.7	0.9	0.8	0.7	0.7	0.7	0.4	0.3	0.8	0.5
Benzo(ghi)perylene	15.39	0.43	0.30	0.32	0.14	0.23	0.09	0.39	0.28	0.28	0.31	0.27	0.20	0.15	0.35	0.23
Chrysene & Triphenylene	56.6	2.8	1.6	1.2	10.7	12.4	8.5	1.4	0.9	1.0	1.0	1.0	0.5	0.4	1.0	0.7
Coronene	2.57	0.12	0.10	0.12	0.05	0.07	0.02	0.07	0.05	0.07	0.05	0.05	0.12	0.20	0.12	0.12
Dibenzo(a,h)anthracene	6.10	0.12	0.10	0.12	0.04	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.12	0.20	0.11	0.12
Fluoranthene	123.5	21.0	6.6	7.3	48.1	60.5	40.3	9.4	8.1	6.0	6.9	6.9	1.8	1.5	2.9	2.4
Fluorene	12.01	5.61	2.20	2.53	1.42	1.56	1.32	0.18	0.27	0.17	0.20	0.17	0.19	0.18	0.21	0.20
Indeno(1,2,3-cd)pyrene	14.84	0.10	0.12	0.11	0.05	0.08	0.03	0.21	0.14	0.15	0.14	0.14	0.15	0.20	0.25	0.20
MW=178, C1-homologs	79.4	8.9	3.7	2.7	6.1	8.6	4.7	1.5	1.3	1.0	1.1	1.0	1.0	0.9	1.6	0.6
MW=178, C2-homologs	49.6	10.4	5.6	2.7	10.7	18.3	10.2	4.3	3.2	2.6	2.9	2.6	1.5	1.1	2.7	0.9
MW=178, C3-homologs	21.8	6.2	3.9	1.7	5.1	9.5	6.1	3.2	2.1	1.9	2.0	1.7	0.9	0.5	1.7	0.9
MW=178, C4-homologs	18.9	2.5	1.5	1.3	1.6	2.7	1.8	0.7	0.5	0.5	0.6	0.5	0.1	0.2	0.2	0.2
MW=228	89.7	5.1	2.6	2.0									0.8	0.5	1.4	1.3
MW=252																
MW=276	39.9	0.5	0.4	0.4	0.6	0.6	0.3	0.8	0.6	0.6	0.6	0.6	0.4	0.3	0.7	0.6
MW=278	18.15	0.12	0.10	0.12	0.31	0.26	0.25	0.24	0.19	0.23	0.21	0.21	0.15	0.20	0.17	0.24

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Mussel [d]	Mussel [d]	Mussel [d]	Mussel [d]	Oyster	Oyster	Oyster	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]
Sampling Station:	SN	WC	WC	WC	LANDM	LANDN	LANDS	GB1	GB2	GB3	GB4	GB5	LAB	LAB	LAB	LAB
Area :	Harbor	Harbor	Harbor	Harbor	Near-site	Near-site	Near-site	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798801	798413	798715	798800	798095	798094	798096	798079	798080	798081	798082	798083	798471	798472	798473	798669
Date:	09/16/90	04/20/90	07/04/90	09/16/90	01/04/89	01/04/89	01/04/89	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	04/27/90	04/27/90	04/27/90	06/20/90
Phase:	II	II	II	II	I	I	I	I	I	I	I	I	II	II	II	II
MW=302	18.0	0.1	0.1	0.1	0.3	0.4	0.2	0.4	0.3	0.3	0.2	0.3	0.1	0.2	0.1	0.1
Perylene	4.75	1.11	0.55	0.63	0.13	0.25	0.19	0.13	0.06	0.09	0.12	0.09	0.16	0.16	0.25	0.11
Phenanthrene	122.1	16.9	8.6	5.9	4.6	5.2	4.1	0.4	0.6	0.5	0.4	0.5	0.7	0.7	1.1	0.5
Pyrene	131.8	24.1	7.8	10.4	23.4	30.0	19.0	6.8	5.6	4.6	5.0	4.8	1.3	1.2	1.7	1.6
PAHs (total parent)					103.0	127.3	89.3	23.0	19.5	15.8	17.7	17.3				
PESTICIDES (ug/kg)																
Chemistry ID No.:					11807	11806	11808	11337	11338							
Replicate:					A	A	A	A	A							
Wet weight:	11.92	10.79	12.88	10.97	11.18	10.32	10.05	10.86	9.83				10.60	11.26	11.10	10.68
Dry weight:	0.83	0.60	0.98	0.68	1.46	1.44	1.22	1.32	1.21				0.92	0.95	0.99	1.07
Dry:Wet Weight Ratio:	0.069	0.055	0.075	0.061	0.130	0.139	0.120	0.121	0.122				0.086	0.083	0.088	0.100
BHC, alpha-	0.036	0.070	0.071	0.033	0.129	0.118	0.112	0.040	0.044				0.074	0.061	0.083	0.071
BHC, gamma-	0.128	0.173	0.034	0.040	0.098	0.073	0.079	0.040	0.044				0.069	0.039	0.053	0.041
Chlordane, alpha-	1.235	0.434	0.541	0.302	1.266	1.571	1.488	0.217	0.172				0.087	0.085	0.131	0.266
Chlordane, gamma-	1.076	0.380	0.409	0.253	1.269	1.682	1.584	0.340	0.292				0.085	0.079	0.143	0.170
DDD, p,p'-	0.780	2.668	2.145	1.427	0.653	1.137	0.187	0.040	0.287				0.093	0.073	0.139	0.158
DDE, p,p'-	0.388	0.517	2.565	1.141	4.810	3.753	3.264	0.040	0.044				0.052	0.049	0.044	0.045
DDT, p,p'-	0.258	0.355	0.446	0.301	4.264	4.365	3.528	0.040	0.044				0.041	0.039	0.040	0.300
Hexachlorobenzene	0.016	0.019	0.027	0.025	0.040	0.028	0.043	0.040	0.044				0.036	0.040	0.046	0.102
PCBs (ug/kg)																
Chemistry ID No.:					11807	11806	11808	11337	11338							
Replicate:					A	A	A	A	A							
Wet weight:	11.92	10.79	12.88	10.97	11.18	10.32	10.05	10.86	9.83				10.60	11.26	11.10	10.68
Dry weight:	0.83	0.60	0.98	0.68	1.46	1.44	1.22	1.32	1.21				0.92	0.95	0.99	1.07
Dry:Wet Weight Ratio:	0.069	0.055	0.075	0.061	0.130	0.139	0.120	0.121	0.122				0.086	0.083	0.088	0.100
Aroclor-1242	0.74	0.82	0.69	0.81	7.80	4.20	5.74	0.82	0.91				0.84	0.79	0.80	0.50
Aroclor-1254	40.6	47.6	74.0	76.9	184.6	175.1	192.0	18.0	16.5				9.3	8.3	14.8	23.3
Aroclor-1242/54	40.6	47.6	74.0	76.9	192.4	179.3	198.0	18.0	16.5				9.3	8.3	14.8	23.8

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *	Clam *
Sampling Station:	LAB	LAB	LAB	LAB	LAB	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV2
Area :	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798670	798671	798840	798841	798842	798084	798440	798441	798442	798657	798658	798659	798852	798853	798854	798085
Date:	06/20/90	06/20/90	09/20/90	09/20/90	09/20/90	11/09/88	04/26/90	04/26/90	04/26/90	06/19/90	06/19/90	06/19/90	09/18/90	09/18/90	09/18/90	11/09/88
Phase:	II	II	II	II	II	I	II	II	II	II	II	II	II	II	II	I
INORGANICS (mg/kg)																
Chemistry ID No.:	18356	18357	18367	18368	18369	10675	18339	18340	18341	18352	18353	18354	18364	18365	18366	10679,80,8
Replicate:	1	1	1	1	1	1	1	1		1	1	1	1	1	1	Average
Wet weight:	14.71	15.43	14.94	15.52	14.80	40.26	14.71	14.86	15.12	14.94	15.17	14.81	15.53	16.51	14.91	31.21
Dry weight:	1.32	1.44	1.62	1.52	1.44	5.37	1.01	1.01	1.32	1.25	1.41	1.10	1.69	1.92	1.55	4.69
Dry:Wet Weight Ratio:	0.090	0.093	0.108	0.098	0.097	0.134	0.069	0.068	0.087	0.084	0.093	0.074	0.109	0.116	0.104	0.149
Arsenic	0.92	0.96	1.10	1.46	1.14	0.30	1.37	0.45	0.70	0.74	0.68	0.59	0.58	0.63	0.73	0.60
Cadmium	0.048	0.077	0.033	0.035	0.067	0.054	0.126	0.054	0.111	0.044	0.013	0.037	0.052	0.051	0.037	0.050
Chromium	0.078	0.106	0.083	0.138	0.077	0.074	0.478	0.235	0.190	0.034	0.043	0.013	0.051	0.121	0.053	0.103
Copper	0.7	1.0	0.8	0.7	0.7	1.5	1.1	1.3	1.1	1.0	1.1	0.9	0.9	1.6	1.3	1.9
Iron	21.2	35.4	29.3	29.2	36.3	23.1	7.2	13.3	13.1	11.8	15.8	11.1	27.8	26.2	29.8	23.9
Lead	0.19	0.32	0.12	0.12	0.19	0.23	0.24	0.22	0.16	0.14	0.17	0.15	0.52	0.30	0.35	0.37
Manganese	1.6	5.1	5.7	3.8	4.2	5.4	2.4	1.9	2.6	2.2	7.3	5.4	6.4	4.5	5.5	8.3
Mercury						0.0064										0.0102
Nickel	1.11	1.31	1.24	1.25	1.16	1.46	1.28	1.33	1.10	1.17	1.81	1.29	1.17	0.97	1.83	1.04
Silver						0.07										0.07
Zinc	7.9	9.5	11.9	9.3	8.6	16.4	5.8	6.3	7.8	8.7	9.4	11.5	14.3	10.8	14.4	13.0
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:						10318										10319
Replicate:						A										A
Wet weight:	10.90	13.56	11.58	12.08	11.32	10.65	10.85	10.42	10.25	11.31	10.43	11.01	11.46	12.48	10.04	10.06
Dry weight:	1.02	1.23	1.27	1.09	1.08	1.09	0.69	0.66	0.83	0.93	0.87	0.80	1.18	1.31	1.09	1.23
Dry:Wet Weight Ratio:	0.093	0.090	0.109	0.089	0.094	0.101	0.063	0.062	0.080	0.081	0.082	0.072	0.102	0.104	0.108	0.121
Anthracene	0.15	0.17	0.17	0.12	0.17	0.23	0.18	0.15	0.20	0.17	0.15	0.14	0.21	0.22	0.24	0.30
Benzofluoranthene	0.6	0.6	0.6	0.5	0.6	2.4	0.5	0.7	0.7	0.7	0.8	0.4	1.1			3.0
Benzotriazole	8.3	12.1	19.2	18.1	16.1	18.5	30.5	14.9	31.8	39.2	44.9	30.5	73.8	71.6	91.9	13.2
Benzotriazole, chlorinated	1.2	1.4	2.5	2.5	2.2	2.2	3.4	1.4	3.3	4.9	5.1	3.1	7.6	7.9	9.8	2.6
Benzo(a)anthracene	0.3	0.4	0.3	0.3	0.4	1.0	0.2	0.2	0.3	0.2	0.3	0.2	0.4	0.4	0.4	1.0
Benzo(a)pyrene	0.17	0.20	0.23	0.14	0.20	0.20	0.10	0.16	0.22	0.15	0.20	0.13	0.26	0.30	0.32	0.39
Benzo(e)pyrene	0.4	0.3	0.4	0.3	0.3	0.7	0.5	0.5	0.8	0.6	0.5	0.4	0.6	0.8	0.9	0.9
Benzo(ghi)perylene	0.17	0.13	0.16	0.14	0.14	0.37	0.17	0.21	0.31	0.23	0.27	0.14	0.25	0.12	0.14	0.66
Chrysene & Triphenylene	0.7	0.7	0.6	0.4	0.5	1.3	0.5	0.8	0.8	0.7	0.7	0.5	0.8	0.9	1.0	2.2
Coronene	0.12	0.09	0.11	0.11	0.11	0.06	0.12	0.12	0.13	0.11	0.12	0.12	0.11	0.10	0.13	0.23
Dibenzo(a,h)anthracene	0.12	0.09	0.11	0.11	0.11	0.05	0.12	0.12	0.13	0.11	0.12	0.12	0.11	0.23	0.26	0.10
Fluoranthene	1.6	1.7	1.2	0.9	1.4	8.1	2.1	3.0	3.3	1.7	1.6	1.5	1.6	1.7	1.7	11.4
Fluorene	0.20	0.23	0.23	0.17	0.23	0.12	0.12	0.34	0.31	0.34	0.30	0.18	0.25	0.22	0.28	0.17
Indeno(1,2,3-cd)pyrene	0.16	0.11	0.13	0.13	0.12	0.27	0.12	0.12	0.19	0.12	0.18	0.12	0.18			0.47
MW=178, C1-homologs	0.7	1.1	0.7	0.6	0.6	1.5	0.9	0.9	1.6	0.6	0.7	0.5	0.7	0.7	0.7	2.5
MW=178, C2-homologs	1.0	1.4	0.6	0.5	0.6	4.3	1.1	1.3	2.1	1.1	1.0	0.8	0.7	0.6	0.7	6.9
MW=178, C3-homologs	0.8	1.1	0.4	0.4	0.4	3.0	1.0	0.7	1.3	0.8	0.8	0.5	0.6	0.6	0.6	4.4
MW=178, C4-homologs	0.2	0.2	0.3	0.2	0.2	1.2	0.1	0.4	0.5	0.3	0.1	0.2	0.3	0.2	0.1	2.0
MW=228	1.1	1.3	0.9	0.8	1.0		0.7	1.1	1.1	1.1	1.1	0.8	1.3	1.4	1.5	
MW=252														1.2	1.4	
MW=276	0.4	0.3	0.4	0.3	0.3	0.9	0.2	0.3	0.6	0.4	0.5	0.2	0.5	0.3	0.4	1.6
MW=278	0.17	0.15	0.22	0.25	0.25	0.19	0.12	0.12	0.12	0.11	0.13	0.12	0.56	0.69	0.84	0.40

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]
Sampling Station:	LAB	LAB	LAB	LAB	LAB	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV2
Area:	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798670	798671	798840	798841	798842	798084	798440	798441	798442	798657	798658	798659	798852	798853	798854	798085
Date:	06/20/90	06/20/90	09/20/90	09/20/90	09/20/90	11/09/88	04/26/90	04/26/90	04/26/90	06/19/90	06/19/90	06/19/90	09/18/90	09/18/90	09/18/90	11/09/88
Phase:	II	II	II	II	II	I	II	II	II	II	II	II	II	II	II	I
MW=302	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8	0.7	0.6
Perylene	0.11	0.09	0.12	0.11	0.11	0.11	0.25	0.25	0.49	0.13	0.11	0.12	0.15	0.18	0.20	0.22
Phenanthrene	0.5	0.7	0.6	0.4	0.7	0.5	0.5	2.4	1.0	0.4	0.4	0.4	0.4	0.4	0.5	0.7
Pyrene	1.1	1.4	1.0	0.8	1.2	6.3	1.9	2.3	2.8	1.6	1.6	1.2	1.8	1.9	2.0	8.8
PAHs (total parent)						22.8										32.9
PESTICIDES (ug/kg)																
Chemistry ID No.:						10318										10319
Replicate:						A										A
Wet weight:	10.90	13.56	11.58	12.08	11.32	10.65	10.85	10.42	10.25	11.31	10.43	11.01	11.46	12.48	10.04	10.06
Dry weight:	1.02	1.23	1.27	1.09	1.08	1.09	0.69	0.66	0.83	0.93	0.87	0.80	1.18	1.31	1.09	1.23
Dry:Wet Weight Ratio:	0.093	0.090	0.109	0.089	0.094	0.101	0.063	0.062	0.080	0.081	0.082	0.072	0.102	0.104	0.108	0.121
BHC, alpha–	0.073	0.077	0.058	0.047	0.054	0.052	0.043	0.035	0.046	0.058	0.061	0.049	0.061	0.065	0.066	0.071
BHC, gamma–	0.040	0.032	0.084	0.067	0.068	0.041	0.056	0.044	0.062	0.038	0.042	0.040	0.047	0.056	0.125	0.044
Chlordane, alpha–	0.193	0.171	0.192	0.165	0.156	0.197	0.098	0.086	0.172	0.256	0.230	0.208	0.220	0.240	0.244	0.179
Chlordane, gamma–	0.110	0.149	0.157	0.126	0.110	0.217	0.105	0.080	0.171	0.220	0.196	0.182	0.159	0.179	0.161	0.202
DDD, p,p'–	0.145	0.162	0.126	0.091	0.089	0.129	0.081	0.066	0.129	0.202	0.221	0.193	0.183	0.222	0.207	0.166
DDE, p,p'–	0.078	0.096	0.261	0.213	0.204	0.424	0.079	0.016	0.052	0.073	0.093	0.116	0.436	0.530	0.446	0.504
DDT, p,p'–	0.180	0.171	0.159	0.125	0.097	0.041	0.040	0.018	0.023	0.108	0.252	0.131	0.397	0.091	0.119	0.044
Hexachlorobenzene	0.111	0.116	0.049	0.036	0.041	0.062	0.019	0.014	0.030	0.055	0.074	0.063	0.033	0.044	0.039	0.109
PCBs (ug/kg)																
Chemistry ID No.:						10318										10319
Replicate:						A										A
Wet weight:	10.90	13.56	11.58	12.08	11.32	10.65	10.85	10.42	10.25	11.31	10.43	11.01	11.46	12.48	10.04	10.06
Dry weight:	1.02	1.23	1.27	1.09	1.08	1.09	0.69	0.66	0.83	0.93	0.87	0.80	1.18	1.31	1.09	1.23
Dry:Wet Weight Ratio:	0.093	0.090	0.109	0.089	0.094	0.101	0.063	0.062	0.080	0.081	0.082	0.072	0.102	0.104	0.108	0.121
Aroclor–1242	0.78	0.88	0.77	0.74	0.79	0.84	0.82	0.85	0.87	1.21	0.91	0.66	0.78	0.71	0.89	0.89
Aroclor–1254	21.5	22.0	20.1	14.6	11.4	7.2	9.9	3.9	12.1	26.7	26.9	21.0	37.0	36.5	42.4	10.7
Aroclor–1242/54	22.2	22.9	20.1	14.6	11.4	7.2	9.9	3.9	12.1	27.9	27.8	21.7	37.0	36.5	42.4	10.7

Detected
Cross–assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft–shell
[c] Blue
[d] Ribbed

TABLE C-6
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [b]	Clam [b]	Clam [b]
Sampling Station:	MV3	MV4	MV5	NJ1	NJ2	NJ3	NJ4	NJ5	PC1	PC2	PC3	PC4	PC5	CC1	CC2	MP1
Area :	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798086	798087	798088	798074	798075	798076	798077	798078	798089	798090	798091	798092	798093	798053	798054	798050
Date:	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	12/22/88	12/22/88	01/03/89
Phase:	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
INORGANICS (mg/kg)																
Chemistry ID No.:	11601	11602	11603	11591	11592	11593	11594	11595	11604	11605	11606	11607	11608	11821		11250
Replicate:	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
Wet weight:	15.16	15.80	15.25	15.07	15.06	15.79	14.73	15.28	14.72	15.33	14.75	15.96	14.91	15.22		14.99
Dry weight:	2.07	2.09	2.06	1.47	1.56	1.86	1.31	2.00	2.34	2.26	2.23	2.37	2.19	2.01		2.41
Dry:Wet Weight Ratio:	0.137	0.132	0.135	0.098	0.104	0.118	0.089	0.131	0.159	0.147	0.151	0.148	0.147	0.132		0.162
Arsenic	1.17	1.35	1.13	0.74	1.49	1.08	1.29	1.27	0.87	0.90	0.83	0.75	0.93	0.45		
Cadmium	0.063	0.069	0.079	0.093	0.073	0.079	0.078	0.082	0.085	0.094	0.115	0.103	0.101	0.033		
Chromium	0.092	0.100	0.085	0.046	0.142	0.066	0.190	0.085	0.067	0.074	0.077	0.080	0.100	0.276		
Copper	2.2	2.6	2.8	1.4	1.7	1.4	1.2	1.6	3.4	3.1	3.8	3.4	2.8	2.7		
Iron	20.8	17.9	16.3	16.4	13.2	15.6	13.2	16.4	16.0	16.5	14.7	16.2	16.6	132.9		
Lead	0.15	0.16	0.17	0.17	0.05	0.11	0.13	0.12	0.38	0.35	0.40	0.41	0.27	0.45		
Manganese	4.2	5.1	10.4	15.0	4.9	6.1	5.8	9.6	4.6	3.7	5.7	5.9	6.6	2.1		
Mercury																0.0126
Nickel	1.82	2.00	2.22	1.04	1.25	1.43	1.98	1.50	1.46	1.35	1.76	1.57	1.92	0.47		
Silver	0.12	0.11	0.12	0.17	0.13	0.11	0.13	0.32	0.13	0.19	0.13	0.14	0.13	0.23		
Zinc	16.2	19.0	20.4	15.7	11.9	12.5	10.0	14.4	16.6	14.7	16.8	15.2	16.7	11.2		
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:	11352	11352	11360	11325	11326	11334	11335	11336	11361	11362	11363	11364	11365	11802	11803	11245
Replicate:	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Wet weight:	10.73	10.73	10.45	11.17	9.88	9.59	10.79	9.78	10.32	10.32	10.13	10.27	10.42	10.78	10.01	10.21
Dry weight:	1.12	1.12	1.18	1.23	1.21	0.95	0.94	1.11	1.55	1.28	1.43	1.38	1.44	1.36	1.16	1.60
Dry:Wet Weight Ratio:	0.104	0.104	0.112	0.109	0.121	0.098	0.086	0.113	0.150	0.123	0.140	0.133	0.137	0.125	0.115	0.156
Anthracene	0.24	0.28	0.28	0.09	0.09	5.14	0.06	0.09	0.14	0.17	0.22	0.16	0.21	0.21	0.15	0.77
Benzofluoranthene	1.7	2.0	2.0	0.9	0.9	22.9	1.0	1.0	2.3	1.3	1.6	1.4	2.7	3.3	3.0	4.7
Benzotriazole	30.2	21.4	13.0	4.9	12.0	6.8	5.5	9.5	23.3	22.0	26.2	24.5	33.3	24.9	20.4	65.8
Benzotriazole, chlorinated	4.7	3.9	2.6	1.2	2.1	1.2	1.3	1.8	4.7	3.6	5.3	5.1	6.7	3.6	3.1	5.2
Benzo(a)anthracene	1.3	1.3	1.8	0.4	0.6	16.6	0.4	0.7	1.1	0.6	1.0	0.9	1.5	1.8	2.4	4.0
Benzo(a)pyrene	0.32	0.54	0.41	0.18	0.14	9.62	0.30	0.18	0.34	0.34	0.31	0.29	0.55	0.64	0.55	0.98
Benzo(e)pyrene	1.1	1.2	1.7	0.7	0.7	8.1	0.7	0.8	2.1	1.0	1.6	1.4	2.3	2.5	2.4	3.6
Benzo(ghi)perylene	0.48	0.56	0.67	0.32	0.32	5.64	0.53	0.31	0.82	0.42	0.56	0.59	0.91	1.38	1.25	1.58
Chrysene & Triphenylene	2.2	2.2	2.7	0.9	1.0	10.3	0.7	0.9	2.3	1.8	1.8	1.6	2.1	3.5	2.8	6.2
Coronene	0.11	0.20	0.18	0.05	0.05	1.71	0.09	0.06	0.16	0.11	0.09	0.12	0.14	0.26	0.15	0.21
Dibenzo(a,h)anthracene	0.09	0.15	0.09	0.05	0.04	2.17	0.07	0.06	0.08	0.46	0.09	0.06	0.11	0.25	0.18	0.13
Fluoranthene	14.2	12.2	17.7	4.9	5.6	43.1	3.0	5.0	8.4	7.7	7.3	7.6	10.5	12.8	10.8	22.8
Fluorene	0.29	0.35	0.28	0.11	0.13	2.16	0.11	0.14	0.24	0.23	0.26	0.12	0.11	0.44	0.48	1.44
Indeno(1,2,3-cd)pyrene	0.28	0.38	0.44	0.19	0.18	6.73	0.33	0.20	0.47	0.27	0.30	0.27	0.47	0.85	0.81	0.74
MW=178, C1-homologs	1.9	1.8	2.5	0.9	1.0	10.1	0.7	0.9	1.7	1.5	1.7	1.6	2.1	2.7	2.4	9.8
MW=178, C2-homologs	5.6	4.8	6.8	2.0	2.1	6.6	1.5	2.1	3.2	2.9	2.9	3.1	4.9	4.6	4.4	18.1
MW=178, C3-homologs	3.6	3.1	4.6	1.3	1.4	2.9	1.1	1.3	2.5	2.0	2.1	2.2	4.3	3.9	3.4	12.2
MW=178, C4-homologs	1.1	1.1	1.8	0.6	0.7	0.7	0.5	0.4	1.3	1.0	0.9	0.9	2.2	1.4	1.2	3.9
MW=228																
MW=252																
MW=276	1.8	1.3	1.6	0.7	0.6	22.4	1.2	0.6	1.6	1.1	1.1	1.2	2.0	3.3	3.0	5.0
MW=278	0.63	0.61	0.64	0.30	0.26	9.25	0.52	0.28	0.68	0.07	0.39	0.43	0.89	1.00	0.84	0.13

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [a]	Clam [b]	Clam [b]	Clam [b]
Sampling Station:	MV3	MV4	MV5	NJ1	NJ2	NJ3	NJ4	NJ5	PC1	PC2	PC3	PC4	PC5	CC1	CC2	MP1
Area :	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798086	798087	798088	798074	798075	798076	798077	798078	798089	798090	798091	798092	798093	798053	798054	798050
Date:	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	11/09/88	12/22/88	12/22/88	01/03/89
Phase:	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
MW=302	0.5	0.3	0.5	0.2	0.3	15.1	0.7	0.4	0.6	0.4	0.3	0.5	0.7	1.3	0.9	0.5
Perylene	0.22	0.23	0.18	0.15	0.11	2.81	0.24	0.13	0.28	0.17	0.28	0.30	0.48	0.48	0.82	0.58
Phenanthrene	0.8	0.8	0.8	0.5	0.4	21.9	0.5	0.6	0.6	0.6	0.9	0.6	0.8	1.9	2.0	6.1
Pyrene	10.4	9.6	12.9	3.6	3.8	30.0	2.1	3.4	8.5	6.9	7.1	7.0	11.2	10.0	8.3	16.4
PAHs (total parent)	37.4	33.9	44.7	14.1	15.1	224.4	12.1	14.5	29.9	23.5	24.9	24.3	37.1	44.8	39.3	75.2
PESTICIDES (ug/kg)																
Chemistry ID No.:			11360	11325	11326	11334	11335	11336	11361	11362	11363	11364	11365	11802	11803	
Replicate:			A	A	A	A	A	A	A	A	A	A	A	A	A	
Wet weight:			10.45	11.17	9.88	9.59	10.79	9.78	10.32	10.32	10.13	10.27	10.42	10.78	10.01	
Dry weight:			1.18	1.23	1.21	0.95	0.94	1.11	1.55	1.28	1.43	1.38	1.44	1.36	1.16	
Dry:Wet Weight Ratio:			0.112	0.109	0.121	0.098	0.086	0.113	0.150	0.123	0.140	0.133	0.137	0.125	0.115	
BHC, alpha–			0.041	0.039	0.045	0.045	0.040	0.044	0.042	0.042	0.043	0.043	0.042	0.078	0.076	
BHC, gamma–			0.041	0.039	0.045	0.045	0.040	0.044	0.042	0.042	0.043	0.043	0.042	0.073	0.078	
Chlordane, alpha–			0.195	0.039	0.045	0.045	0.040	0.044	0.285	0.042	0.234	0.238	0.277	0.040	0.044	
Chlordane, gamma–			0.260	0.039	0.045	0.045	0.040	0.044	0.359	0.261	0.332	0.306	0.344	0.341	0.276	
DDD, p,p'–			0.041	0.039	0.045	0.045	0.040	0.044	0.042	0.042	0.043	0.043	0.042	4.075	3.105	
DDE, p,p'–			0.593	0.039	0.045	0.045	0.040	0.044	0.670	0.042	0.043	0.545	0.647	0.301	0.395	
DDT, p,p'–			0.041	0.039	0.045	0.045	0.040	0.044	0.042	0.042	0.043	0.043	0.042	0.040	0.044	
Hexachlorobenzene			0.073	0.039	0.045	0.045	0.040	0.044	0.059	0.042	0.043	0.070	0.071	0.056	0.106	
PCBs (ug/kg)																
Chemistry ID No.:			11360	11325	11326	11334	11335	11336	11361	11362	11363	11364	11365	11802	11803	11245
Replicate:			A	A	A	A	A	A	A	A	A	A	A	A	A	A
Wet weight:			10.45	11.17	9.88	9.59	10.79	9.78	10.32	10.32	10.13	10.27	10.42	10.78	10.01	10.21
Dry weight:			1.18	1.23	1.21	0.95	0.94	1.11	1.55	1.28	1.43	1.38	1.44	1.36	1.16	1.60
Dry:Wet Weight Ratio:			0.112	0.109	0.121	0.098	0.086	0.113	0.150	0.123	0.140	0.133	0.137	0.125	0.115	0.156
Aroclor–1242			0.85	0.80	0.90	0.93	0.83	0.91	0.87	0.87	0.88	0.87	0.86	0.11	0.89	0.81
Aroclor–1254			35.3	13.6	12.1	5.4	5.3	8.8	35.0	17.3	25.8	30.2	37.7	14.9	14.5	25.6
Aroclor–1242/54			35.3	13.6	12.1	5.4	5.3	8.8	35.0	17.3	25.8	30.2	37.7	15.0	14.5	26.4

Detected
Cross–assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft–shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE – SITE 09

Sample Type:	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Mussel [a]	Mussel [a]	Mussel [a]	Mussel [a]	Mussel [a]	Mussel [a]	Mussel [a]	Mussel [a]	Mussel [a]	Mussel [a]
Sampling Station:	MP1	MP2	MP3	MP3	PR SALTPOND		LAB	LAB	LAB	LAB	LAB	LAB	LAB	LAB	LAB	LAB
Area :	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798050	798051	798052	798052	798922	798901	798158	798160/61	798317	798318	798319	798546	798547	798548	798573	798574
Date:	01/03/89	01/03/89	01/03/89	01/03/89			06/06/89	06/06/89	04/30/90	04/30/90	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90	10/11/90
Phase:	I	I	I	I	III	III	I	I	II	II	II	II	II	II	II	II
INORGANICS (mg/kg)																
Chemistry ID No.:	11250	11820	11251	11251	19159	19161	11829	11830	17830	17831	17832	17842	17843	17844	18129	18130
Replicate:	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Wet weight:	15.10	15.11	15.61	15.33	14.97	14.97	15.00	15.01	15.24	15.87	14.82	15.14	15.98	15.60	17.27	16.70
Dry weight:	2.44	2.38	3.27	3.22	1.02	1.15	2.32	2.33	2.45	3.10	2.27	2.31	2.36	2.34	1.46	1.33
Dry:Wet Weight Ratio:	0.162	0.158	0.210	0.210	0.068	0.077	0.155	0.155	0.161	0.195	0.153	0.153	0.148	0.150	0.085	0.080
Arsenic	0.61	0.57		0.69	0.39	0.37	0.57	0.53	0.27	0.30	0.29	0.54	0.57	0.59	0.43	0.41
Cadmium	0.043	0.050		0.072	0.033	0.010	0.147	0.163	0.141	0.199	0.196	0.103	0.119	0.106	0.073	0.072
Chromium	0.105	0.145		0.231	0.143	0.053	0.140	0.122	0.158	0.244	0.164	0.155	0.178	0.182	0.105	0.081
Copper	3.6	4.4		5.3	0.7	1.1	1.1	1.2	1.3	1.1	1.3	0.5	0.9	0.7	0.2	0.2
Iron	59.2	66.8		210.7	91.8	34.3	45.9	41.8	66.7	108.0	68.9	67.5	78.6	87.0	37.1	33.0
Lead	0.17	0.31		0.31	0.37	0.28	0.51	0.55	0.57	0.85	0.54	0.44	0.48	0.50	0.27	0.24
Manganese	1.9	1.4		3.0	1.5	4.2	1.6	1.5	3.9	5.5	4.2	3.9	3.7	3.9	1.9	1.7
Mercury			0.0105													
Nickel	0.43	0.32		0.35	0.06	0.03	0.31	0.31	0.28	0.36	0.30	0.21	0.25	0.25	0.08	0.05
Silver	0.42	0.29		0.58			0.01	0.02								
Zinc	12.9	15.3		13.9	2.9	5.0	15.3	14.3	11.1	18.3	10.8	9.8	10.4	10.9	4.3	3.9

SEMIVOLATILES (ug/kg)																
Chemistry ID No.:		11801	11246				11773	11774								
Replicate:		A	A				A	A								
Wet weight:		13.06	11.49		11.20	11.20	10.19	10.06	10.73	11.42	10.35	11.62	11.72	10.23	11.05	10.83
Dry weight:		2.06	2.45		1.51	1.51	1.48	1.51	1.64	1.75	1.43	1.67	1.64	1.42	0.93	0.87
Dry:Wet Weight Ratio:		0.157	0.212		0.133	0.133	0.144	0.150	0.152	0.152	0.137	0.143	0.139	0.138	0.084	0.080
Anthracene		0.59	1.21		0.12	0.12	0.41	0.32	0.55	0.61	0.50	0.35	0.33	0.39	0.14	0.13
Benzofluoranthene		5.2	7.1		3.4	3.9	2.9	3.2	0.8	0.8	1.0	1.9	2.0	2.2	1.7	1.8
Benzotriazole		87.8	77.0		1.8	1.9	49.7	51.3	64.0	56.4	45.5	33.7	30.9	34.8	6.7	5.9
Benzotriazole, chlorinated		11.5	5.5		0.9	1.1	6.8	7.7	4.8	5.0	3.8	3.2	2.9	3.5	0.9	0.8
Benzo(a)anthracene		5.2	4.8		1.0	1.5	1.0	1.2	0.4	0.5	0.5	0.6	0.6	0.7	0.5	0.4
Benzo(a)pyrene		0.92	1.55		1.30	1.37	0.57	0.66	0.49	0.55	0.58	0.38	0.39	0.48	0.27	0.29
Benzo(e)pyrene		4.2	4.8		3.0	3.1	2.5	2.7	1.9	2.1	2.2	1.8	1.6	1.9	1.3	1.3
Benzo(ghi)perylene		2.09	2.23		1.61	1.49	1.53	1.46	0.43	0.44	0.60	0.52	0.53	0.61	0.51	0.49
Chrysene & Triphenylene		6.9	7.7		2.2	3.1	2.1	1.8	1.7	1.7	1.8	1.3	1.2	1.7	0.9	0.8
Coronene		0.16	0.17		0.11	0.11	0.45	0.30	0.12	0.11	0.12	0.11	0.11	0.13	0.12	0.12
Dibenzo(a,h)anthracene		1.09	0.11		0.11	0.11	0.26	0.26	0.23	0.11	0.29	0.21	0.19	0.27	0.13	0.12
Fluoranthene		25.1	28.2		3.5	4.4	9.0	8.1	7.2	7.5	8.0	4.4	4.2	5.7	2.3	2.1
Fluorene		1.42	1.85		0.11	0.11	2.25	0.63	0.89	0.97	0.75	0.48	0.45	0.49	0.22	0.12
Indeno(1,2,3-cd)pyrene		1.04	1.56		0.11	0.11	0.85	0.77	0.33	0.53	0.43	0.37	0.39	0.46	0.32	0.34
MW=178, C1-homologs		8.3	13.2		1.9	1.7	2.1	2.3	3.4	3.8	3.6	1.6	1.6	1.9	1.3	1.2
MW=178, C2-homologs		13.0	23.1		3.4	1.7	2.4	3.0	4.1	4.4	4.5	2.3	1.9	2.6	1.9	2.0
MW=178, C3-homologs		8.9	13.7		2.0	0.1	2.3	2.7	3.1	3.7	3.5	2.0	1.9	2.2	2.0	2.3
MW=178, C4-homologs		2.4	4.5		0.1	0.1	1.1	1.3	0.8	0.6	0.7	0.7	0.4	0.7	0.6	1.0
MW=228					3.8	4.8			2.4	2.5	2.4	2.1	2.1	2.5	1.5	1.2
MW=252					1.6	1.5										
MW=276		4.6	6.4		2.2	2.2	3.3	3.0	1.1	1.4	1.4	1.2	1.1	1.4	1.0	0.9
MW=278		6.92	0.11		0.11	0.11	1.39	1.13	0.95	1.28	1.28	0.54	0.72	0.75	0.32	0.12

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Clam [b]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]
Sampling Station:	MP1	MP2	MP3	MP3	PR SALTPOND		LAB	LAB	LAB	LAB	LAB	LAB	LAB	LAB	LAB	LAB
Area :	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay
Sample No.:	798050	798051	798052	798052	798922	798901	798158	798160/61	798317	798318	798319	798546	798547	798548	798573	798574
Date:	01/03/89	01/03/89	01/03/89	01/03/89			06/06/89	06/06/89	04/30/90	04/30/90	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90	10/11/90
Phase:	I	I	I	I	III	III	I	I	II	II	II	II	II	II	II	II
MW=302		1.1	1.0		0.1	0.1	1.8	1.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Perylene		0.81	0.75		0.11	0.73	0.39	0.29	0.25	0.25	0.27	1.02	0.79	0.74	0.31	0.53
Phenanthrene		6.6	9.0		1.1	1.8	3.3	2.3	2.6	2.9	2.4	1.0	0.9	1.2	0.7	0.7
Pyrene		18.1	20.5		4.6	4.5	5.4	5.3	2.7	3.1	3.0	3.5	3.4	4.5	2.2	2.0
PAHs (total parent)		89.0	98.6				37.7	33.2								
PESTICIDES (ug/kg)																
Chemistry ID No.:		11801					11773	11774								
Replicate:		A					A	A								
Wet weight:		13.06			11.20	11.20	10.19	10.06	10.73	11.42	10.35	11.62	11.72	10.23	11.05	10.83
Dry weight:		2.06			1.51	1.51	1.48	1.51	1.64	1.75	1.43	1.67	1.64	1.42	0.93	0.87
Dry:Wet Weight Ratio:		0.157			0.143	0.143	0.144	0.150	0.152	0.152	0.137	0.143	0.139	0.138	0.084	0.080
BHC, alpha-		0.103			0.102	0.079	0.167	0.074	0.170	0.169	0.156	0.105	0.098	0.109	0.045	0.046
BHC, gamma-		0.100			0.092	0.079	0.074	0.062	0.192	0.179	0.196	0.070	0.065	0.079	0.024	0.024
Chlordane, alpha-		0.628			0.063	0.094	0.920	0.914	0.924	0.935	0.832	0.521	0.488	0.540	0.154	0.134
Chlordane, gamma-		0.441			0.199	0.106	1.017	1.002	0.903	0.882	0.811	0.399	0.396	0.431	0.137	0.121
DDD, p,p'-		7.348			0.126	0.107	1.365	1.377	1.093	1.067	0.989	0.562	0.498	0.537	0.169	0.153
DDE, p,p'-		0.200			0.209	0.169	1.264	1.771	0.965	1.053	0.544	1.118	0.669	0.756	0.119	0.028
DDT, p,p'-		0.033			0.116	0.092	0.433	0.458	0.295	0.304	0.279	0.084	0.085	0.093	0.061	0.166
Hexachlorobenzene		0.053			0.094	0.077	0.072	0.075	0.046	0.048	0.045	0.035	0.034	0.039	0.023	0.019
PCBs (ug/kg)																
Chemistry ID No.:		11801	11246				11773	11774								
Replicate:		A	A				A	A								
Wet weight:		13.06	11.49		11.20	11.20	10.19	10.06	10.73	11.42	10.35	11.62	11.72	10.23	11.05	10.83
Dry weight:		2.06	2.45		1.51	1.51	1.48	1.51	1.64	1.75	1.43	1.67	1.64	1.42	0.93	0.87
Dry:Wet Weight Ratio:		0.157	0.212		0.143	0.143	0.144	0.150	0.152	0.152	0.137	0.143	0.139	0.138	0.084	0.080
Aroclor-1242		3.34	1.56		14.24	0.85	4.81	5.34	4.59	4.82	4.04	2.56	1.58	2.03	0.81	0.83
Aroclor-1254		54.2	22.7		35.3	10.9	133.5	156.0	95.8	98.8	91.9	101.0	93.4	105.6	31.0	10.8
Aroclor-1242/54		57.6	24.4		50.1	10.9	138.4	160.5	100.5	103.7	95.9	103.5	94.9	107.5	31.0	10.8

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *	Mussel *
Sampling Station:	LAB	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	TD	TD	TD	TTN2
Area :	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Time zero	Time zero	Time zero	Bay
Sample No.:	798575	798150	798152	798305	798306	798307	798534	798535	798536	798561	798562	798563	798323	798551	798578	798154
Date:	10/11/90	06/06/89	06/06/89	04/30/90	04/30/90	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90	10/11/90	10/11/90	04/02/90	07/16/90	10/11/90	06/06/89
Phase:	II	I	I	II	II	II	II	II	II	II	II	II	II	II	II	I
INORGANICS (mg/kg)																
Chemistry ID No.:	18131	11825	11826	17833	17834	17835	17845	17846	17847	18132	18133	18134	17823	17848	18135	11827
Replicate:	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1
Wet weight:	17.08	15.05	15.06	19.51	14.82	14.91	14.93	14.99	16.07	15.70	17.47	17.04	15.62	16.74	16.14	15.06
Dry weight:	1.39	2.42	2.37	3.61	2.84	2.77	2.35	2.39	2.42	1.47	1.68	1.78	2.14	1.88	1.62	2.45
Dry:Wet Weight Ratio:	0.081	0.161	0.157	0.185	0.192	0.186	0.157	0.159	0.151	0.094	0.096	0.104	0.137	0.112	0.100	0.163
Arsenic	0.40	0.49	0.53	0.25	0.27	0.27	0.62	0.58	0.53	0.51	0.46	0.49	0.30	0.36	0.50	0.45
Cadmium	0.064	0.323	0.351	0.174	0.189	0.181	0.110	0.126	0.122	0.064	0.057	0.067	0.131	0.116	0.068	0.263
Chromium	0.084	0.382	0.367	0.204	0.202	0.156	0.168	0.183	0.270	0.153	0.159	0.087	0.125	0.077	0.052	0.624
Copper	0.2	1.8	1.8	1.7	1.3	2.0	0.9	1.0	1.0	0.4	0.3	0.6	1.1	0.4	0.2	1.8
Iron	34.7	85.0	88.9	51.4	54.7	52.3	47.3	53.4	84.3	50.6	54.9	29.8	33.8	17.9	23.7	87.8
Lead	0.26	0.97	1.19	0.58	0.65	0.57	0.50	0.54	0.62	0.40	0.36	0.30	0.42	0.36	0.18	0.91
Manganese	1.5	2.7	2.6	2.8	3.0	3.3	3.0	3.1	3.9	1.7	2.3	1.3	2.3	1.0	0.7	3.7
Mercury																
Nickel	0.04	0.65	0.85	0.32	0.32	0.31	0.25	0.26	0.31	0.15	0.14	0.06	0.32	0.17	0.02	1.15
Silver		0.02	0.02													0.01
Zinc	3.9	24.1	30.2	11.5	14.3	13.2	11.3	11.0	10.1	5.2	6.3	4.4	9.5	8.4	4.4	30.0
SEMIVOLATILES (ug/kg)																
Chemistry ID No.:		11769	11770													11771
Replicate:		A	A													A
Wet weight:	10.37	10.69	9.88	10.59	10.56	11.08	12.20	11.04	12.15	11.39	10.59	10.81	10.66	11.16	11.24	10.10
Dry weight:	0.83	1.53	1.53	1.81	1.84	1.88	1.78	1.63	1.76	1.00	0.96	1.05	1.32	1.14	1.01	1.53
Dry:Wet Weight Ratio:	0.080	0.143	0.154	0.170	0.174	0.169	0.145	0.147	0.144	0.087	0.090	0.097	0.123	0.101	0.090	0.150
Anthracene	0.15	0.01	0.61	0.77	0.84	0.97	0.51	0.46	0.48	0.29	0.34	0.24	0.61	0.38	0.42	0.64
Benzofluoranthene	1.9	0.1	7.7	1.1	1.3	1.2	2.9	3.2	3.8	3.6	5.0	3.5	1.4	1.2	1.1	6.4
Benzotriazole	7.8	1.3	101.5	111.5	125.1	114.8	85.3	75.6	81.5	34.1	44.2	40.0	52.4	60.0	1.9	99.6
Benzotriazole, chlorinated	0.9	0.3	14.4	8.4	10.1	9.3	7.1	6.0	6.7	3.2	4.1	3.5	4.7	4.4	0.3	13.6
Benzo(a)anthracene	0.5	0.1	2.8	0.6	0.5	0.6	0.7	0.7	0.7	0.6	1.3	0.7	0.4	0.3	0.5	3.1
Benzo(a)pyrene	0.32	0.03	1.47	0.57	0.57	0.64	0.48	0.48	0.75	0.84	1.32	0.53	0.31	0.26	0.19	1.04
Benzo(e)pyrene	1.3	0.1	6.3	3.2	3.5	2.9	3.2	3.0	3.6	2.6	3.0	2.8	1.7	1.6	0.8	6.2
Benzo(ghi)perylene	0.57	0.05	3.23	0.68	0.69	0.53	0.87	0.93	1.38	1.10	1.46	0.78	0.60	0.60	0.25	2.82
Chrysene & Triphenylene	0.9	0.1	3.3	2.6	2.7	3.2	2.0	1.9	2.0	1.6	2.1	1.6	2.2	0.8	0.8	4.5
Coronene	0.13	0.01	0.77	0.12	0.12	0.12	0.11	0.12	0.18	0.11	0.17	0.12	0.17	0.12	0.12	0.67
Dibenzo(a,h)anthracene	0.15	0.01	0.73	0.16	0.14	0.14	0.11	0.22	0.38	0.26	0.54	0.23	0.12	0.12	0.12	0.54
Fluoranthene	2.3	0.3	12.6	13.8	15.2	15.8	6.5	5.7	6.5	3.4	4.1	4.3	11.9	4.3	3.8	21.9
Fluorene	0.20	0.02	0.58	1.23	1.21	1.07	0.32	0.26	0.26	0.11	0.16	0.14	1.77	0.51	0.39	0.62
Indeno(1,2,3-cd)pyrene	0.38	0.03	2.20	0.44	0.53	0.37	0.52	0.52	0.88	0.75	1.20	0.55	0.12	0.29	0.13	1.76
MW=178, C1-homologs	1.2	0.1	2.7	5.3	6.0	6.5	2.2	2.1	2.2	1.3	1.8	1.2	5.2	2.0	1.2	2.7
MW=178, C2-homologs	1.8	0.1	4.5	6.9	7.8	8.1	2.9	2.7	3.0	2.0	1.9	1.8	5.7	1.8	1.3	4.3
MW=178, C3-homologs	2.0	0.1	5.3	5.5	6.2	6.3	3.2	2.7	3.4	2.9	2.1	2.2	4.2	2.0	0.8	4.2
MW=178, C4-homologs	0.7	0.0	3.0	0.7	1.2	0.8	0.7	0.8	1.2	1.1	0.7	0.8	0.6	0.5	0.7	2.1
MW=228	1.5			3.6	3.7	4.3	2.8	3.0	3.3	2.3	3.7	2.7	2.8	1.2	1.4	
MW=252																
MW=276	1.1	0.1	6.9	1.4	1.7	1.2	1.7	1.8	2.7	2.1	3.4	1.6	1.3	1.1	0.4	5.8
MW=278	0.39	0.04	2.63	1.33	1.68	1.89	0.69	0.74	0.98	0.35	1.31	0.71	1.28	0.25	0.12	2.04

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]	Mussel [c]
Sampling Station:	LAB	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	MV1	TO	TO	TO	TTN2
Area :	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Bay	Timezero	Timezero	Timezero	Bay
Sample No.:	798575	798150	798152	798305	798306	798307	798534	798535	798536	798561	798562	798563	798323	798551	798578	798154
Date:	10/11/90	06/06/89	06/06/89	04/30/90	04/30/90	04/30/90	07/16/90	07/16/90	07/16/90	10/11/90	10/11/90	10/11/90	04/02/90	07/16/90	10/11/90	06/06/89
Phase:	II	I	I	II	II	II	II	II	II	II	II	II	II	II	II	I
MW=302	0.1	0.0	3.1	0.2	0.2	0.2	0.1	0.1	0.5	0.1	1.2	0.2	0.1	0.1	0.1	2.4
Perylene	0.32	0.01	0.73	0.61	0.39	0.28	0.69	0.68	0.72	0.70	0.65	0.60	0.25	0.39	0.50	0.50
Phenanthrene	0.7	0.1	1.9	3.3	3.3	3.3	0.7	0.6	0.9	0.5	0.7	0.4	5.5	2.2	2.0	1.8
Pyrene	2.1	0.3	12.7	5.0	5.5	6.1	7.1	6.3	7.0	4.8	4.9	4.7	4.1	3.4	3.2	17.7
PAHs (total parent)		1.4	65.3													77.1
PESTICIDES (ug/kg)																
Chemistry ID No.:																
Replicate:																
Wet weight:	10.37	10.69	9.88	10.59	10.56	11.08	12.20	11.04	12.15	11.39	10.59	10.81	10.66	11.16	11.24	10.10
Dry weight:	0.83	1.53	1.53	1.81	1.84	1.88	1.78	1.63	1.76	1.00	0.96	1.05	1.32	1.14	1.01	1.53
Dry:Wet Weight Ratio:	0.080	0.143	0.154	0.170	0.174	0.169	0.145	0.147	0.144	0.087	0.090	0.097	0.123	0.101	0.090	0.150
BHC, alpha-	0.045	0.139	0.045	0.255	0.261	0.254	0.122	0.103	0.103	0.051	0.049	0.061	0.182	0.081	0.052	0.107
BHC, gamma-	0.027	0.095	0.092	0.376	0.364	0.257	0.148	0.134	0.121	0.064	0.054	0.073	0.205	0.071	0.049	0.064
Chlordane, alpha-	0.154	1.213	1.351	1.316	1.392	1.364	0.918	0.810	0.747	0.284	0.275	0.318	1.028	0.730	0.261	1.013
Chlordane, gamma-	0.134	1.270	1.423	1.362	1.456	1.377	0.805	0.732	0.690	0.273	0.253	0.298	0.926	0.641	0.192	1.047
DDD, p,p'-	0.176	1.530	2.187	1.637	1.740	1.663	0.982	0.873	0.809	0.359	0.328	0.416	0.868	0.705	0.595	1.433
DDE, p,p'-	0.074	2.031	1.655	1.037	1.479	2.265	0.960	0.878	0.936	0.617	0.667	0.922	0.894	0.859	0.889	1.529
DDT, p,p'-	0.063	0.041	0.428	0.428	0.452	0.446	0.072	0.060	0.070	0.055	0.055	0.093	0.241	0.204	0.151	0.282
Hexachlorobenzene	0.017	0.062	0.049	0.076	0.079	0.087	0.029	0.029	0.028	0.029	0.029	0.034	0.067	0.016	0.029	0.052
PCBs (ug/kg)																
Chemistry ID No.:		11769	11770													11771
Replicate:		A	A													A
Wet weight:	10.37	10.68	9.88	10.59	10.56	11.08	12.20	11.04	12.15	11.39	10.59	10.81	10.66	11.16	11.24	10.10
Dry weight:	0.83	1.53	1.53	1.81	1.84	1.88	1.78	1.63	1.76	1.00	0.96	1.05	1.32	1.14	1.01	1.53
Dry:Wet Weight Ratio:	0.080	0.143	0.154	0.170	0.174	0.169	0.145	0.147	0.144	0.087	0.090	0.097	0.123	0.101	0.090	0.150
Aroclor-1242	0.87	3.25	2.33	6.92	7.88	9.08	5.44	4.81	4.26	1.06	0.65	1.07	2.90	2.29	0.80	3.81
Aroclor-1254	29.4	150.2	117.0	105.6	120.2	120.3	119.5	121.9	118.1	64.6	50.2	64.1	77.1	89.1	30.7	118.4
Aroclor-1242/54	29.4	153.0	119.4	112.5	128.2	129.5	124.8	126.7	122.3	65.7	50.9	65.2	80.1	91.4	30.7	122.1

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Mussel *	Oyster	Oyster	Oyster
Sampling Station:	TTN2	PI	PI	PI
Area :	Bay	Bay	Bay	Bay
Sample No.:	798156	798097	798098	798099
Date:	06/06/89	01/04/89	01/04/89	01/04/89
Phase:	I	I	I	I
INORGANICS (mg/kg)				
Chemistry ID No.:	11828	11815	11816	11817
Replicate:	1	1	1	1
Wet weight:	15.00	15.04	15.00	14.99
Dry weight:	2.56	2.19	2.06	2.18
Dry:Wet Weight Ratio:	0.171	0.146	0.137	0.145
Arsenic	0.46	0.54	0.57	0.50
Cadmium	0.160	0.270	0.269	0.243
Chromium	0.287	0.047	0.059	0.065
Copper	1.7	20.5	20.1	19.1
Iron	61.4	14.1	15.5	16.3
Lead	0.59	0.09	0.09	0.15
Manganese	2.7	1.0	1.2	1.1
Mercury				
Nickel	0.54	0.35	0.59	0.40
Silver	0.02	0.11	0.09	0.11
Zinc	16.0	439.3	466.2	458.4
SEMIVOLATILES (ug/kg)				
Chemistry ID No.:	11772	11809	11810	11811
Replicate:	A	A	A	A
Wet weight:	7.28	5.02	9.81	9.60
Dry weight:	1.19	0.70	1.21	1.39
Dry:Wet Weight Ratio:	0.163	0.139	0.122	0.144
Anthracene	0.65	0.30	0.31	0.23
Benzofluoranthene	6.1	3.5	3.5	1.9
Benzotriazole	89.8	0.3	3.0	6.1
Benzotriazole, chlorinated	15.3	0.2	0.8	1.1
Benzo(a)anthracene	2.6	1.8	3.1	1.9
Benzo(a)pyrene	1.13	0.21	0.21	0.10
Benzo(e)pyrene	5.5	2.0	1.5	1.2
Benzo(ghi)perylene	2.43	0.37	0.40	0.17
Chrysene & Triphenylene	4.5	7.0	4.4	3.5
Coronene	0.44	0.05	0.24	0.03
Dibenzo(a,h)anthracene	0.48	0.16	0.12	0.03
Fluoranthene	28.7	17.9	15.7	12.2
Fluorene	2.95	0.82	0.72	0.73
Indeno(1,2,3-cd)pyrene	1.40	0.13	0.21	0.03
MW=178, C1-homologs	2.7	2.2	2.4	2.0
MW=178, C2-homologs	4.7	5.4	5.1	4.1
MW=178, C3-homologs	5.5	3.8	3.8	2.8
MW=178, C4-homologs	2.0	1.8	1.5	1.3
MW=228				
MW=252				
MW=276	6.0	1.2	0.9	0.3
MW=278	1.94	1.33	0.47	0.09

TABLE C-5
SHELLFISH DATA
(WET WEIGHT BASIS)
NCBC DAVISVILLE - SITE 09

Sample Type:	Mussel [a]	Oyster	Oyster	Oyster
Sampling Station:	TTN2	PI	PI	PI
Area :	Bay	Bay	Bay	Bay
Sample No.:	798156	798097	798098	798099
Date:	06/06/89	01/04/89	01/04/89	01/04/89
Phase:	I	I	I	I
MW=302	2.2	0.6	0.3	0.1
Perylene	0.64	0.06	0.08	0.07
Phenanthrene	2.2	2.1	3.0	2.3
Pyrene	22.8	8.7	8.2	6.7
PAHs (total parent)	91.1	51.4	43.8	32.0
PESTICIDES (ug/kg)				
Chemistry ID No.:				
Replicate:				
Wet weight:	7.28	5.02	9.81	9.60
Dry weight:	1.19	0.70	1.21	1.39
Dry:Wet Weight Ratio:	0.163	0.139	0.122	0.144
BHC, alpha-	0.179	0.143	0.133	0.132
BHC, gamma-	0.110	0.096	0.078	0.049
Chlordane, alpha-	1.416	0.728	0.738	0.556
Chlordane, gamma-	1.475	0.792	0.847	0.660
DDD, p,p'-	2.135	0.088	0.044	0.046
DDE, p,p'-	2.026	0.780	0.875	0.580
DDT, p,p'-	0.365	1.390	0.587	3.442
Hexachlorobenzene	0.089	0.088	0.044	0.046
PCBs (ug/kg)				
Chemistry ID No.:	11772	11809	11810	11811
Replicate:	A	A	A	A
Wet weight:	7.28	5.02	9.81	9.60
Dry weight:	1.19	0.70	1.21	1.39
Dry:Wet Weight Ratio:	0.163	0.139	0.122	0.144
Aroclor-1242	7.07	1.78	2.32	4.74
Aroclor-1254	167.9	79.5	86.0	73.2
Aroclor-1242/54	174.4	79.5	88.3	77.9

Detected
Cross-assignment; same sample
Species average
Not Measured
[a] Quahog
[b] Soft-shell
[c] Blue
[d] Ribbed

TABLE C-6
CALCULATION OF AMBIENT DUST CONCENTRATION
NCBC DAVISVILLE - SITE 09

WIND EROSION DUST EMISSION RATE $(E_w) = a * I * K * C * L * V * A * CF_1 * CF_2$

VEGETATIVE COVER FACTOR (V)	UNSHELTERED FIELD WIDTH FACTOR (L)	CLIMATIC FACTOR (C)	SURFACE ROUGHNESS FACTOR (K)	SOIL ERODIBILITY (I) (ton/acre/year)	PORTION AS SUSPENDED PARTICULATES (a)	CONVERSION FACTOR (CF_1) (year/day)	CONVERSION FACTOR (CF_2) (kg/ton)	AREA (acres)	WIND EROSION EMISSION RATE (E_w) (kg/day)
1	0.7	0.04	1	134	0.010	2.7E-03	907	15	1.4

LOADING AND DUMPING DUST EMISSION RATE $(E_{e/d}) = (V * D * EF) / T$
where $EF = k * 0.0016 * (U / 2.2)^{1.3} / (M / 2)^{1.4}$

MOISTURE CONTENT CONSTANT	MATERIAL MOISTURE CONTENT (M) (%)	WIND SPEED CONSTANT	MEAN WIND SPEED (U) (m/s)	PARTICLE SIZE CONSTANT	PARTICLE SIZE MULTIPLIER (k)	EMISSION FACTOR (EF) (kg/Mg)	TIME (days)	DENSITY OF SOIL (D) (Mg/m3)	VOLUME OF SOIL EXCAVATED (v) (m3)	LOADING AND DUMPING EMISSION RATE $(E_{e/d})$ (kg/day)
2	5	2.2	4.74	1.6E-03	0.74	8.9E-04	30	1.5	5100	0.23

TOTAL FUGITIVE DUST CONCENTRATION $(TSP) = (E_{tot} * CF) / (w * W * H)$
where $E_{tot} = E_w + E_{e/d}$

WIND EROSION EMISSION RATE (E_w) (kg/day)	LOADING AND DUMPING EMISSION RATE $(E_{e/d})$ (kg/day)	TOTAL EMISSION RATE (E_{tot}) (kg/day)	CONVERSION FACTOR (CF) (day/sec)	BREATHING HEIGHT (H) (m)	SITE WIDTH (W) (m)	WIND SPEED (w) (m/s)	TOTAL SUSPENDED DUST CONC. ON-SITE (kg/m3)
1.4	0.23	1.6	1.2E-05	2	246	4.74	8.0E-09

TABLE C-7
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SHELLFISH COLLECTED IN NARRAGANSETT BAY (CLAMS) (a)
NCBC DAVISVILLE – SITE 09

	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location of Maximum Detected Concentration	Geometric Mean Concentration (mg/kg)
INORGANICS							
Arsenic	44	44	1.00	3.05E-01	1.49E+00	NJ2	8.3E-01
Cadmium	44	44	1.00	1.00E-02	1.26E-01	MV1	5.9E-02
Chromium	44	44	1.00	1.33E-02	4.98E-01	LAB	1.1E-01
Copper	44	44	1.00	6.51E-01	5.26E+00	MP2	1.6E+00
Iron	44	44	1.00	7.25E+00	2.11E+02	MP2	2.1E+01
Lead	44	44	1.00	4.99E-02	7.26E-01	LAB	2.0E-01
Manganese	44	44	1.00	1.35E+00	1.50E+01	GB1	4.7E+00
Mercury	4	4	1.00	6.36E-03	1.26E-02	MP1	9.6E-03
Nickel	44	43	0.98	6.32E-02	2.22E+00	GB3	1.1E+00
Silver	24	24	1.00	7.13E-02	5.75E-01	MP3	1.4E-01
Zinc	44	44	1.00	2.93E+00	2.04E+01	MV5	1.2E+01
SEMIVOLATILES							
Anthracene	45	43	0.96	6.07E-05	5.14E-03	NJ3	1.9E-04
Benzofluoranthene	43	43	1.00	4.31E-04	2.29E-02	NJ3	1.3E-03
Benzotriazole	45	45	1.00	1.77E-03	9.19E-02	MV1	2.0E-02
Benzotriazole, chlorinated	45	45	1.00	8.88E-04	1.15E-02	MP2	3.0E-03
Benzo(a)anthracene	45	45	1.00	1.67E-04	1.66E-02	NJ3	6.8E-04
Benzo(a)pyrene	45	44	0.98	9.15E-05	9.62E-03	NJ3	3.0E-04
Benzo(e)pyrene	45	45	1.00	2.91E-04	8.11E-03	NJ3	9.5E-04
Benzo(ghi)perylene	45	45	1.00	1.17E-04	5.64E-03	NJ3	4.0E-04
Chrysene & Triphenylene	45	45	1.00	3.98E-04	1.03E-02	NJ3	1.3E-03
Coronene	45	25	0.56	4.68E-05	1.71E-03	NJ3	1.2E-04
Dibenzo(a,h)anthracene	45	26	0.58	2.39E-05	2.17E-03	NJ3	1.1E-04
Fluoranthene	45	45	1.00	9.35E-04	4.31E-02	NJ3	4.8E-03
Fluorene	45	43	0.96	1.08E-04	2.16E-03	NJ3	2.4E-04
Indeno(1,2,3-cd)pyrene	43	38	0.88	1.13E-04	6.73E-03	MP3	2.5E-04
MW=178, C1-homologs	45	45	1.00	5.23E-04	1.32E-02	MP3	1.4E-03
MW=178, C2-homologs	45	45	1.00	5.30E-04	2.31E-02	MP3	2.3E-03
MW=178, C3-homologs	45	44	0.98	3.56E-04	1.37E-02	MP3	1.5E-03
MW=178, C4-homologs	45	39	0.87	1.19E-04	4.45E-03	MP3	4.9E-04
MW=228	20	20	1.00	4.98E-04	4.76E-03	SALTPOND	1.2E-03
MW=252	4	4	1.00	1.17E-03	1.61E-03	PR	1.4E-03
MW=276	45	45	1.00	2.19E-04	2.24E-02	NJ3	8.9E-04
MW=278	45	36	0.80	6.81E-05	9.25E-03	NJ3	3.0E-04
MW=302	45	27	0.60	1.89E-04	1.51E-02	NJ3	2.9E-04
Perylene	45	42	0.93	6.21E-05	2.81E-03	NJ3	2.1E-04
Phenanthrene	45	45	1.00	3.52E-04	2.19E-02	NJ3	8.3E-04
Pyrene	45	45	1.00	8.20E-04	3.00E-02	NJ3	3.9E-03
PAHs (total parent)	25	25	1.00	1.21E-02	2.24E-01	NJ3	3.1E-02
PESTICIDES/PCBs							
BHC, alpha-	38	25	0.66	3.47E-05	1.03E-04	MP2	5.5E-05
BHC, gamma-	38	17	0.45	3.93E-05	1.25E-04	MV1	5.1E-05
Chlordane, alpha-	38	30	0.79	6.29E-05	6.28E-04	MP2	1.3E-04
Chlordane, gamma-	38	33	0.87	7.93E-05	4.41E-04	MP2	1.5E-04
DDD, p,p'-	38	26	0.68	6.57E-05	7.35E-03	MP2	1.2E-04
DDE, p,p'-	38	29	0.76	1.59E-05	6.70E-04	PC1	1.2E-04
DDT, p,p'-	38	16	0.42	1.81E-05	3.97E-04	MV1	6.4E-05
Hexachlorobenzene	38	29	0.76	1.43E-05	1.16E-04	LAB	5.2E-05
Aroclor-1242	40	11	0.28	1.11E-04	1.42E-02	PR	8.9E-04
Aroclor-1254	40	40	1.00	3.91E-03	5.42E-02	MP2	1.7E-02
Aroclor-1242/54	40	40	1.00	3.91E-03	5.76E-02	MP2	1.8E-02

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent
(a) Includes the following samples locations; GB1, GB2, GB3, GB4, GB5, LAB, MV1, MV2, MV3, MV4, MV5, NJ1, NJ2, NJ3, NJ4, NJ5, PC1, PC2, PC3, PC4, PC5, CC1, CC2, MP1, MP2, MP3, PR, AND SALTPOND

TABLE C–7 (cont.)
SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SHELLFISH COLLECTED IN NARRAGANSETT BAY (MUSSELS) (a)
NCBC DAVISVILLE – SITE 09

	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location of Maximum Detected Concentration	Geometric Mean Concentration (mg/kg)
INORGANICS							
Arsenic	22	22	1.00	2.48E–01	6.17E–01	MV1	4.3E–01
Cadmium	22	22	1.00	5.71E–02	3.51E–01	MV1	1.3E–01
Chromium	22	22	1.00	8.08E–02	3.82E–01	MV1	1.6E–01
Copper	22	22	1.00	1.74E–01	2.05E+00	MV1	8.0E–01
Iron	22	22	1.00	2.98E+01	1.08E+02	LAB	5.7E+01
Lead	22	22	1.00	2.43E–01	1.19E+00	MV1	5.0E–01
Manganese	22	22	1.00	1.26E+00	5.46E+00	LAB	2.7E+00
Mercury	0	0	ND	––	––		––
Nickel	22	22	1.00	4.05E–02	8.54E–01	MV1	2.2E–01
Silver	4	4	1.00	1.40E–02	2.25E–02	MV1	1.9E–02
Zinc	22	22	1.00	3.90E+00	3.02E+01	MV1	1.0E+01
SEMIVOLATILES							
Anthracene	22	21	0.95	9.27E–06	9.70E–04	MV1	3.3E–04
Benzofluoranthene	22	22	1.00	1.25E–04	7.70E–03	MV1	1.9E–03
Benzotriazole	22	22	1.00	1.26E–03	1.25E–01	MV1	3.7E–02
Benzotriazole, chlorinated	22	22	1.00	2.55E–04	1.44E–02	MV1	3.7E–03
Benzo(a)anthracene	22	22	1.00	6.18E–05	2.80E–03	MV1	6.1E–04
Benzo(a)pyrene	22	22	1.00	2.52E–05	1.47E–03	MV1	4.8E–04
Benzo(e)pyrene	22	22	1.00	1.14E–04	6.25E–03	MV1	2.1E–03
Benzo(ghi)perylene	22	22	1.00	5.16E–05	3.23E–03	MV1	7.0E–04
Chrysene & Triphenylene	22	22	1.00	7.61E–05	3.33E–03	MV1	1.5E–03
Coronene	22	7	0.32	1.15E–05	7.73E–04	MV1	1.3E–04
Dibenzo(a,h)anthracene	22	20	0.91	1.25E–05	7.32E–04	MV1	1.9E–04
Fluoranthene	22	22	1.00	3.20E–04	1.58E–02	MV1	5.2E–03
Fluorene	22	20	0.91	1.66E–05	2.25E–03	MV1	3.7E–04
Indeno(1,2,3–cd)pyrene	22	22	1.00	3.43E–05	2.20E–03	MV1	4.8E–04
MW=178, C1–homologs	22	22	1.00	5.45E–05	6.52E–03	MV1	1.9E–03
MW=178, C2–homologs	22	22	1.00	8.37E–05	8.06E–03	MV1	2.6E–03
MW=178, C3–homologs	22	22	1.00	7.92E–05	6.25E–03	MV1	2.5E–03
MW=178, C4–homologs	22	22	1.00	4.78E–05	3.05E–03	MV1	7.3E–04
MW=228	18	18	1.00	1.24E–03	4.28E–03	MV1	2.5E–03
MW=252	0	0	ND	––	––		––
MW=276	22	22	1.00	1.16E–04	6.95E–03	MV1	1.5E–03
MW=278	22	21	0.95	4.35E–05	2.63E–03	MV1	7.3E–04
MW=302	22	12	0.55	4.63E–05	3.13E–03	MV1	2.1E–04
Perylene	22	22	1.00	1.46E–05	1.02E–03	LAB	4.1E–04
Phenanthrene	22	22	1.00	7.06E–05	3.31E–03	MV1	1.1E–03
Pyrene	22	22	1.00	2.85E–04	1.27E–02	MV1	3.8E–03
PAHs (total parent)	4	4	1.00	1.36E–03	6.53E–02	MV1	1.8E–02
PESTICIDES/PCBs							
BHC, alpha–	22	21	0.95	4.46E–05	2.61E–04	MV1	1.0E–04
BHC, gamma–	22	22	1.00	2.39E–05	3.76E–04	MV1	9.5E–05
Chlordane, alpha–	22	22	1.00	1.34E–04	1.39E–03	MV1	6.0E–04
Chlordane, gamma–	22	22	1.00	1.21E–04	1.46E–03	MV1	5.7E–04
DDD, p,p'–	22	22	1.00	1.53E–04	2.19E–03	MV1	7.2E–04
DDE, p,p'–	22	22	1.00	2.77E–05	2.26E–03	MV1	7.1E–04
DDT, p,p'–	22	21	0.95	5.49E–05	4.58E–04	LAB	1.4E–04
Hexachlorobenzene	22	22	1.00	1.69E–05	8.70E–05	MV1	4.0E–05
Aroclor–1242	22	19	0.86	6.48E–04	9.08E–03	MV1	2.7E–03
Aroclor–1254	22	22	1.00	1.08E–02	1.56E–01	LAB	8.3E–02
Aroclor–1242/54	22	22	1.00	1.08E–02	1.61E–01	LAB	8.6E–02

ND = Not detected
* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent
(a) Includes the following samples locations; LAB, MV1

TABLE C-7 (cont.)

SUMMARY STATISTICS FOR CONSTITUENTS ANALYZED FOR PRESENCE IN SHELLFISH COLLECTED IN NARRAGANSETT BAY (OYSTERS) (a)

NCBC DAVISVILLE – SITE 09

	Number of Samples	Times Detected	Frequency of Detection	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Location of Maximum Detected Concentration	Geometric Mean Concentration (mg/kg)
INORGANICS							
Arsenic	3	3	1.00	5.02E-01	5.70E-01	P1	5.4E-01
Cadmium	3	3	1.00	2.43E-01	2.70E-01	P1	2.6E-01
Chromium	3	3	1.00	4.67E-02	6.53E-02	P1	5.6E-02
Copper	3	3	1.00	1.91E+01	2.05E+01	P1	2.0E+01
Iron	3	3	1.00	1.41E+01	1.63E+01	P1	1.5E+01
Lead	3	3	1.00	8.61E-02	1.49E-01	P1	1.1E-01
Manganese	3	3	1.00	9.53E-01	1.23E+00	P1	1.1E+00
Mercury	0	0	ND	--	--	P1	--
Nickel	3	3	1.00	3.53E-01	5.92E-01	P1	4.4E-01
Silver	3	3	1.00	9.45E-02	1.07E-01	P1	1.0E-01
Zinc	3	3	1.00	4.39E+02	4.66E+02	P1	4.5E+02
SEMIVOLATILES							
Anthracene	3	3	1.00	2.26E-04	3.05E-04	P1	2.8E-04
Benzofluoranthene	3	3	1.00	1.90E-03	3.54E-03	P1	2.9E-03
Benzotriazole	3	3	1.00	2.54E-04	6.08E-03	P1	1.7E-03
Benzotriazole, chlorinated	3	3	1.00	2.20E-04	1.10E-03	P1	5.7E-04
Benzo(a)anthracene	3	3	1.00	1.82E-03	3.12E-03	P1	2.2E-03
Benzo(a)pyrene	3	3	1.00	9.60E-05	2.11E-04	P1	1.6E-04
Benzo(e)pyrene	3	3	1.00	1.16E-03	1.99E-03	P1	1.5E-03
Benzo(ghi)perylene	3	3	1.00	1.71E-04	4.03E-04	P1	3.0E-04
Chrysene & Triphenylene	3	3	1.00	3.50E-03	7.01E-03	P1	4.7E-03
Coronene	3	3	1.00	2.69E-05	2.43E-04	P1	6.7E-05
Dibenzo(a,h)anthracene	3	3	1.00	2.58E-05	1.60E-04	P1	7.8E-05
Fluoranthene	3	3	1.00	1.22E-02	1.79E-02	P1	1.5E-02
Fluorene	3	3	1.00	7.22E-04	8.24E-04	P1	7.6E-04
Indeno(1,2,3-cd)pyrene	3	3	1.00	3.48E-05	2.09E-04	P1	9.9E-05
MW=178, C1-homologs	3	3	1.00	1.96E-03	2.44E-03	P1	2.2E-03
MW=178, C2-homologs	3	3	1.00	4.13E-03	5.41E-03	P1	4.8E-03
MW=178, C3-homologs	3	3	1.00	2.75E-03	3.82E-03	P1	3.4E-03
MW=178, C4-homologs	3	3	1.00	1.29E-03	1.75E-03	P1	1.5E-03
MW=228	0	0	ND	--	--	P1	--
MW=252	0	0	ND	--	--	P1	--
MW=276	3	3	1.00	2.79E-04	1.23E-03	P1	6.8E-04
MW=278	3	3	1.00	8.80E-05	1.33E-03	P1	3.8E-04
MW=302	3	3	1.00	6.55E-05	6.48E-04	P1	2.3E-04
Perylene	3	3	1.00	5.63E-05	7.64E-05	P1	6.8E-05
Phenanthrene	3	3	1.00	2.13E-03	2.99E-03	P1	2.5E-03
Pyrene	3	3	1.00	6.70E-03	8.69E-03	P1	7.8E-03
PAHs (total parent)	3	3	1.00	3.20E-02	5.14E-02	P1	4.2E-02
PESTICIDES/PCBs							
BHC, alpha-	3	3	1.00	1.32E-04	1.43E-04	P1	1.4E-04
BHC, gamma-	3	3	1.00	4.88E-05	9.59E-05	P1	7.2E-05
Chlordane, alpha-	3	3	1.00	5.56E-04	7.38E-04	P1	6.7E-04
Chlordane, gamma-	3	3	1.00	6.60E-04	8.47E-04	P1	7.6E-04
DDD, p,p'-	3	0	ND	--	--	P1	--
DDE, p,p'-	3	3	1.00	5.80E-04	8.75E-04	P1	7.3E-04
DDT, p,p'-	3	3	1.00	5.87E-04	3.44E-03	P1	1.4E-03
Hexachlorobenzene	3	0	ND	--	--	P1	--
Aroclor-1242	3	2	0.67	2.32E-03	4.74E-03	P1	2.7E-03
Aroclor-1254	3	3	1.00	7.32E-02	8.60E-02	P1	7.9E-02
Aroclor-1242/54	3	3	1.00	7.79E-02	8.83E-02	P1	8.2E-02

ND = Not detected

* = Mean exceeds the maximum detected concentration as a result of sample quantitation limits (SQLs) reported for this constituent

(a) Includes samples location P1

APPENDIX D

SITE 09: EXPOSURE AND RISK ESTIMATES

LIST OF TABLES

TABLE D-1
SCENARIO 1 - FUTURE CONSTRUCTION (ADULT WORKERS)
EXPOSURE AND RISK ESTIMATES
INCIDENTAL INGESTION OF SOIL
NCBC DAVISVILLE - SITE 09

	Soil Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Antimony	1.3E+01	9.0E+01	1	8.9E-07	6.0E-06	6.2E-05	4.2E-04	NA	4.0E-04	NA	NA	2E-01	1E+00
Arsenic	3.1E+00	1.4E+01	1	2.1E-07	9.1E-07	1.5E-05	6.4E-05	1.8E+00	3.0E-04	4E-07	2E-06	5E-02	2E-01
Barium	5.5E+01	6.8E+02	1	3.7E-06	4.6E-05	2.6E-04	3.2E-03	NA	7.0E-02	NA	NA	4E-03	5E-02
Beryllium	1.1E+00	5.6E+00	1	7.6E-08	3.8E-07	5.3E-06	2.6E-05	4.3E+00	5.0E-03	3E-07	2E-06	1E-03	5E-03
Cadmium	3.5E+00	5.6E+01	1	2.3E-07	3.8E-06	1.6E-05	2.6E-04	NA	1.0E-03	NA	NA	2E-02	3E-01
Chromium III	1.7E+01	1.3E+02	1	1.1E-06	9.0E-06	7.8E-05	6.3E-04	NA	1.0E+00	NA	NA	8E-05	6E-04
Chromium VI	2.4E+00	1.9E+01	1	1.6E-07	1.3E-06	1.1E-05	9.0E-05	NA	2.0E-02	NA	NA	6E-04	5E-03
Cobalt	8.9E+00	2.6E+01	1	6.0E-07	1.8E-06	4.2E-05	1.2E-04	NA	NA	NA	NA	NA	NA
Copper	1.0E+02	2.8E+03	1	6.7E-06	1.8E-04	4.7E-04	1.3E-02	NA	3.7E-02	NA	NA	1E-02	3E-01
Lead	1.3E+02	2.1E+03	0.3	2.6E-06	4.3E-05	1.8E-04	3.0E-03	NA	NA	NA	NA	NA	NA
Manganese	1.9E+02	1.3E+03	1	1.3E-05	8.5E-05	8.9E-04	6.0E-03	NA	1.4E-01	NA	NA	6E-03	4E-02
Mercury	2.3E-01	1.7E+00	1	1.5E-08	1.1E-07	1.1E-06	8.0E-06	NA	3.0E-04	NA	NA	4E-03	3E-02
Nickel	3.0E+01	2.3E+02	1	2.0E-06	1.5E-05	1.4E-04	1.1E-03	NA	2.0E-02	NA	NA	7E-03	5E-02
Silver	1.5E+00	3.5E+01	1	9.7E-08	2.3E-06	6.8E-06	1.6E-04	NA	5.0E-03	NA	NA	1E-03	3E-02
Thallium	6.0E-01	6.9E-01	1	4.0E-08	4.6E-08	2.8E-06	3.2E-06	NA	8.0E-04	NA	NA	4E-03	4E-03
Vanadium	2.3E+01	8.2E+02	1	1.5E-06	5.5E-05	1.1E-04	3.9E-03	NA	7.0E-03	NA	NA	2E-02	6E-01
Zinc	3.3E+02	3.1E+03	1	2.2E-05	2.1E-04	1.6E-03	1.4E-02	NA	3.0E-01	NA	NA	5E-03	5E-02
VOLATILES													
Acetone	4.7E-02	5.9E+01	1	3.2E-09	4.0E-06	2.2E-07	2.8E-04	NA	1.0E+00	NA	NA	2E-07	3E-04
Benzene	1.3E-02	1.5E+00	1	8.8E-10	1.0E-07	6.1E-08	7.0E-06	2.9E-02	NA	3E-11	3E-09	NA	NA
Butanone, 2-	2.0E-02	1.8E+02	1	1.3E-09	1.2E-05	9.3E-08	8.5E-04	NA	2.0E-01	NA	NA	5E-07	4E-03
Chlorobenzene	1.6E-02	1.8E-01	1	1.1E-09	1.2E-08	7.4E-08	8.5E-07	NA	2.0E-02	NA	NA	4E-06	4E-05
Chloroform	7.7E-03	2.0E-03	1	5.2E-10	1.3E-10	3.6E-08	9.4E-09	6.1E-03	1.0E-02	3E-12	8E-13	4E-06	9E-07
Ethylbenzene	1.5E-02	9.1E+02	1	1.0E-09	6.1E-05	7.3E-08	4.3E-03	NA	1.0E-01	NA	NA	7E-07	4E-02
Tetrachloroethene	1.3E-02	2.0E-03	1	9.0E-10	1.3E-10	6.3E-08	9.4E-09	5.2E-02	1.0E-01	5E-11	7E-12	6E-07	9E-08
Toluene	1.4E-02	1.5E+04	1	9.6E-10	1.0E-03	6.7E-08	7.0E-02	NA	2.0E+00	NA	NA	3E-08	4E-02
Trichloroethene	1.0E-02	3.8E+00	1	6.8E-10	2.5E-07	4.8E-08	1.8E-05	1.1E-02	NA	7E-12	3E-09	NA	NA
Xylenes (Total)	2.4E-02	4.2E+03	1	1.6E-09	2.8E-04	1.1E-07	2.0E-02	NA	2.0E+00	NA	NA	6E-08	1E-02
SEMIVOLATILES													
Acenaphthene	4.6E-01	1.7E+01	1	3.1E-08	1.1E-06	2.1E-06	8.0E-05	NA	6.0E-01	NA	NA	4E-06	1E-04
Acenaphthylene	3.1E-01	5.1E-02	1	2.1E-08	3.4E-09	1.4E-06	2.4E-07	NA	NA	NA	NA	NA	NA
Anthracene	5.1E-01	2.3E+01	1	3.4E-08	1.5E-06	2.4E-06	1.1E-04	NA	3.0E+00	NA	NA	8E-07	4E-05
Benzo(a)anthracene	1.1E+00	4.1E+01	1	7.1E-08	2.8E-06	5.0E-06	1.9E-04	7.3E+00	NA	5E-07	2E-05	NA	NA
Benzo(a)pyrene	9.6E-01	2.2E+01	1	6.5E-08	1.5E-06	4.5E-06	1.0E-04	7.3E+00	NA	5E-07	1E-05	NA	NA
Benzo(b/k)fluoranthene	2.1E+00	8.2E+01	1	1.4E-07	5.5E-06	1.0E-05	3.9E-04	7.3E+00	NA	1E-06	4E-05	NA	NA
Benzo(ghi)perylene	6.3E-01	1.5E+01	1	4.2E-08	1.0E-06	2.9E-06	7.0E-05	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	1.0E+00	3.3E+01	1	6.9E-08	2.2E-06	4.8E-06	1.5E-04	1.4E-02	2.0E-02	1E-09	3E-08	2E-04	8E-03
Butyl benzyl phthalate	5.1E-01	8.3E+00	1	3.4E-08	5.6E-07	2.4E-06	3.9E-05	NA	2.0E+00	NA	NA	1E-06	2E-05
Carbazole	6.3E-01	1.0E+01	1	4.2E-08	6.7E-07	3.0E-06	4.7E-05	NA	NA	NA	NA	NA	NA
Chrysene	1.0E+00	2.1E+01	1	7.0E-08	1.4E-06	4.9E-06	9.9E-05	7.3E+00	NA	5E-07	1E-05	NA	NA
Dibenzofuran	4.6E-01	1.2E+01	1	3.1E-08	8.1E-07	2.2E-06	5.6E-05	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	5.4E-01	6.4E+00	1	3.6E-08	4.3E-07	2.5E-06	3.0E-05	7.3E+00	NA	3E-07	3E-06	NA	NA
Dichlorobenzene, 1,2-	6.3E-01	4.3E+00	1	4.2E-08	2.9E-07	3.0E-06	2.0E-05	NA	9.0E-02	NA	NA	3E-05	2E-04
Dichlorobenzene, 1,4-	5.5E-01	8.4E-01	1	3.7E-08	5.6E-08	2.6E-06	3.9E-06	2.4E-02	NA	9E-10	1E-09	NA	NA
Diethyl phthalate	3.2E-01	4.4E-02	1	2.1E-08	3.0E-09	1.5E-06	2.1E-07	NA	8.0E+00	NA	NA	2E-07	3E-08
Di-n-butyl phthalate	4.4E-01	1.3E+00	1	2.9E-08	8.7E-08	2.1E-06	6.1E-06	NA	1.0E+00	NA	NA	2E-06	6E-06
Fluoranthene	1.8E+00	9.4E+01	1	1.2E-07	6.3E-06	8.3E-06	4.4E-04	NA	4.0E-01	NA	NA	2E-05	1E-03
Fluorene	4.5E-01	1.8E+01	1	3.1E-08	1.2E-06	2.1E-06	8.5E-05	NA	4.0E-01	NA	NA	5E-06	2E-04
Indeno(1,2,3-cd)pyrene	5.9E-01	1.5E+01	1	3.9E-08	1.0E-06	2.8E-06	7.0E-05	7.3E+00	NA	3E-07	7E-06	NA	NA

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION WORKER (ADULTS AGED 18 TO 70 YEARS)
EXPOSURE AND RISK ESTIMATES
INCIDENTAL INGESTION OF SOIL (cont)
NCBC DAVISVILLE - SITE 09

	Soil Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
SEMIVOLATILES (cont)													
Methylnaphthalene, 2-	7.1E-01	5.0E+00	1	4.7E-08	3.4E-07	3.3E-06	2.3E-05	NA	NA	NA	NA	NA	NA
Methylphenol, 4-	3.2E-01	2.8E-01	1	2.2E-08	1.9E-08	1.5E-06	1.3E-06	NA	5.0E-02	NA	NA	3E-05	3E-05
Naphthalene	5.4E-01	1.9E+01	1	3.7E-08	1.3E-06	2.6E-06	8.9E-05	NA	4.0E-02	NA	NA	6E-05	2E-03
Phenanthrene	1.4E+00	1.1E+02	1	9.2E-08	7.4E-06	6.4E-06	5.2E-04	NA	NA	NA	NA	NA	NA
Pyrene	1.4E+00	8.1E+01	1	9.7E-08	5.4E-06	6.8E-06	3.8E-04	NA	3.0E-01	NA	NA	2E-05	1E-03
PESTICIDES/PCBs													
Aldrin	3.6E-03	3.6E-03	1	2.4E-10	2.4E-10	1.7E-08	1.7E-08	1.7E+01	3.0E-05	4E-09	4E-09	6E-04	6E-04
BHC, alpha-	2.1E-03	9.8E-04	1	1.4E-10	6.6E-11	1.0E-08	4.6E-09	6.3E+00	3.0E-03	9E-10	4E-10	3E-06	2E-06
BHC, beta-	6.2E-03	4.2E-02	1	4.2E-10	2.8E-09	2.9E-08	2.0E-07	1.8E+00	3.0E-03	7E-10	5E-09	1E-05	7E-05
Chlordane, alpha	1.4E-02	1.3E-02	0.3	2.9E-10	2.6E-10	2.0E-08	1.8E-08	1.3E+00	6.0E-05	4E-10	3E-10	3E-04	3E-04
Chlordane, gamma-	1.1E-02	7.6E-03	0.3	2.2E-10	1.5E-10	1.6E-08	1.1E-08	1.3E+00	6.0E-05	3E-10	2E-10	3E-04	2E-04
DDD, 4,4'-	2.1E-02	3.2E-01	0.3	4.2E-10	6.4E-09	2.9E-08	4.5E-07	2.4E-01	5.0E-04	1E-10	2E-09	6E-05	9E-04
DDE, 4,4'-	1.6E-02	8.9E-01	0.3	3.2E-10	1.8E-08	2.3E-08	1.3E-06	3.4E-01	5.0E-04	1E-10	6E-09	5E-05	3E-03
DDT, 4,4'-	1.6E-02	6.6E-02	0.3	3.3E-10	1.3E-09	2.3E-08	9.3E-08	3.4E-01	5.0E-04	1E-10	5E-10	5E-05	2E-04
Dieldrin	5.8E-03	1.2E-02	0.3	1.2E-10	2.4E-10	8.2E-09	1.7E-08	1.6E+01	5.0E-05	2E-09	4E-09	2E-04	3E-04
Endosulfan II	1.2E-02	7.2E-02	1	8.1E-10	4.8E-09	5.6E-08	3.4E-07	NA	6.0E-03	NA	NA	9E-06	6E-05
Endrin	5.6E-03	1.7E-03	0.3	1.1E-10	3.4E-11	7.9E-09	2.4E-09	NA	3.0E-04	NA	NA	3E-05	8E-06
Aroclor-1260	2.4E-01	1.7E+00	0.3	4.9E-09	3.4E-08	3.4E-07	2.4E-06	7.7E+00	NA	4E-08	3E-07	NA	NA

(a) Subsurface soil concentrations

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	4E-06	1E-04	3E-01	3E+00

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x IR x RAF x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Unit Conversion (UC) =	1E-06 kg/mg
Ingestion Rate (IR) =	480 mg/d
Relative Absorption Factor (RAF) =	CS Constituent-specific (--)
Exposure Frequency (EF) =	250 d/yr
Exposure Duration (ED) =	1 yr
Body Weight (BW) =	70 kg
Averaging Time (AT) =	25550 d (cancer) 365 d (noncancer)

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION (ADULT WORKERS)
CANCER RISK ESTIMATES USING TEFs FOR CARCINOGENIC PAHs
INCIDENTAL INGESTION OF SOIL
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
INORGANICS		
Antimony	NA	NA
Arsenic	4E-07	2E-06
Barium	NA	NA
Beryllium	3E-07	2E-06
Cadmium	NA	NA
Chromium III	NA	NA
Chromium VI	NA	NA
Cobalt	NA	NA
Copper	NA	NA
Lead	NA	NA
Manganese	NA	NA
Mercury	NA	NA
Nickel	NA	NA
Silver	NA	NA
Thallium	NA	NA
Vanadium	NA	NA
Zinc	NA	NA
VOLATILES		
Acetone	NA	NA
Benzene	3E-11	3E-09
Butanone, 2-	NA	NA
Chlorobenzene	NA	NA
Chloroform	3E-12	8E-13
Ethylbenzene	NA	NA
Tetrachloroethene	5E-11	7E-12
Toluene	NA	NA
Trichloroethene	7E-12	3E-09
Xylenes (Total)	NA	NA
SEMIVOLATILES		
Acenaphthene	NA	NA
Acenaphthylene	NA	NA
Anthracene	NA	NA
Benzo(a)anthracene ^	8E-08	3E-06
Benzo(a)pyrene ^	5E-07	1E-05
Benzo(b/k)fluoranthene ^	1E-07	6E-06
Benzo(ghi)perylene	NA	NA
bis(2-Ethylhexyl)phthalate	1E-09	3E-08
Butyl benzyl phthalate	NA	NA
Carbazole	NA	NA
Chrysene ^	2E-09	5E-08
Dibenzofuran	NA	NA
Dibenzo(a,h)anthracene ^	3E-07	3E-06
Dichlorobenzene, 1,2-	NA	NA
Dichlorobenzene, 1,4-	9E-10	1E-09
Diethyl phthalate	NA	NA
Di-n-butyl phthalate	NA	NA
Fluoranthene	NA	NA
Fluorene	NA	NA
Indeno(1,2,3-cd)pyrene ^	7E-08	2E-06

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION (ADULTS AGED 18 TO 70 YEARS
CANCER RISK ESTIMATES USING TEFs FOR CARCINOGENIC PAHs
INCIDENTAL INGESTION OF SOIL
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
SEMIVOLATILES (cont)		
Methylnaphthalene, 2-	NA	NA
Methylphenol, 4-	NA	NA
Naphthalene	NA	NA
Phenanthrene	NA	NA
Pyrene	NA	NA
PESTICIDES/PCBs		
Aldrin	4E-09	4E-09
BHC, alpha-	9E-10	4E-10
BHC, beta-	7E-10	5E-09
Chlordane, alpha	4E-10	3E-10
Chlordane, gamma-	3E-10	2E-10
DDD, 4,4'-	1E-10	2E-09
DDE, 4,4'-	1E-10	6E-09
DDT, 4,4'-	1E-10	5E-10
Dieldrin	2E-09	4E-09
Endosulfan II	NA	NA
Endrin	NA	NA
Aroclor-1260	4E-08	3E-07

	Mean Cancer Risk	RME Cancer Risk
TOTAL:	2E-06	3E-05

= Cancer risk > 1E-06

^ Carcinogenic PAH

TABLE D-1 (cont.)
SCENARIO 1 – FUTURE CONSTRUCTION (ADULT WORKERS)
EXPOSURE AND RISK ESTIMATES
DERMAL CONTACT WITH SOIL
NCBC DAVISVILLE – SITE 09

Constituent	Soil Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Antimony	1.3E+01	9.0E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-04	NA	NA	NA	NA
Arsenic	3.1E+00	1.4E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00	3.0E-04	NA	NA	NA	NA
Barium	5.5E+01	6.8E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	7.0E-02	NA	NA	NA	NA
Beryllium	1.1E+00	5.6E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.3E+00	5.0E-03	NA	NA	NA	NA
Cadmium	3.5E+00	5.6E+01	0.01	4.8E-09	7.9E-08	3.4E-07	5.5E-06	NA	1.0E-03	NA	NA	3E-04	6E-03
Chromium III	1.7E+01	1.3E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E+00	NA	NA	NA	NA
Chromium VI	2.4E+00	1.9E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-02	NA	NA	NA	NA
Cobalt	8.9E+00	2.6E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Copper	1.0E+02	2.8E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.7E-02	NA	NA	NA	NA
Lead	1.3E+02	2.1E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Manganese	1.9E+02	1.3E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.4E-01	NA	NA	NA	NA
Mercury	2.3E-01	1.7E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-04	NA	NA	NA	NA
Nickel	3.0E+01	2.3E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-02	NA	NA	NA	NA
Silver	1.5E+00	3.5E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Thallium	6.0E-01	6.9E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.0E-04	NA	NA	NA	NA
Vanadium	2.3E+01	8.2E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	7.0E-03	NA	NA	NA	NA
Zinc	3.3E+02	3.1E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-01	NA	NA	NA	NA
VOLATILES													
Acetone	4.7E-02	5.9E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E+00	NA	NA	NA	NA
Benzene	1.3E-02	1.5E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-02	NA	NA	NA	NA	NA
Butanone, 2-	2.0E-02	1.8E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-01	NA	NA	NA	NA
Chlorobenzene	1.6E-02	1.8E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-02	NA	NA	NA	NA
Chloroform	7.7E-03	2.0E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-03	1.0E-02	NA	NA	NA	NA
Ethylbenzene	1.5E-02	9.1E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E-01	NA	NA	NA	NA
Tetrachloroethene	1.3E-02	2.0E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.2E-02	1.0E-01	NA	NA	NA	NA
Toluene	1.4E-02	1.5E+04	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E+00	NA	NA	NA	NA
Trichloroethene	1.0E-02	3.8E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-02	NA	NA	NA	NA	NA
Xylenes (Total)	2.4E-02	4.2E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E+00	NA	NA	NA	NA
SEMIVOLATILES													
Acenaphthene	4.6E-01	1.7E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	6.0E-01	NA	NA	NA	NA
Acenaphthylene	3.1E-01	5.1E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Anthracene	5.1E-01	2.3E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E+00	NA	NA	NA	NA
Benzo(a)anthracene	1.1E+00	4.1E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Benzo(a)pyrene	9.6E-01	2.2E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Benzo(b/k)fluoranthene	2.1E+00	8.2E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Benzo(ghi)perylene	6.3E-01	1.5E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	1.0E+00	3.3E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02	2.0E-02	NA	NA	NA	NA
Butyl benzyl phthalate	5.1E-01	8.3E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E+00	NA	NA	NA	NA
Carbazole	6.3E-01	1.0E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Chrysene	1.0E+00	2.1E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Dibenzofuran	4.6E-01	1.2E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	5.4E-01	6.4E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Dichlorobenzene, 1,2-	6.3E-01	4.3E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	9.0E-02	NA	NA	NA	NA
Dichlorobenzene, 1,4-	5.5E-01	8.4E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-02	NA	NA	NA	NA	NA
Diethyl phthalate	3.2E-01	4.4E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.0E+00	NA	NA	NA	NA
Di-n-butyl phthalate	4.4E-01	1.3E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E+00	NA	NA	NA	NA
Fluoranthene	1.8E+00	9.4E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-01	NA	NA	NA	NA
Fluorene	4.5E-01	1.8E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-01	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5.9E-01	1.5E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA

TABLE D-1 (cont.)
SCENARIO 1 – FUTURE CONSTRUCTION WORKER (ADULTS AGED 18 TO 70 YEARS)
EXPOSURE AND RISK ESTIMATES
DERMAL CONTACT WITH SOIL (cont)
NCBC DAVISVILLE – SITE 09

	Soil Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
SEMIVOLATILES (cont)													
Methylnaphthalene, 2-	7.1E-01	5.0E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Methylphenol, 4-	3.2E-01	2.8E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-02	NA	NA	NA	NA
Naphthalene	5.4E-01	1.9E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-02	NA	NA	NA	NA
Phenanthrene	1.4E+00	1.1E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Pyrene	1.4E+00	8.1E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-01	NA	NA	NA	NA
PESTICIDES/PCBs													
Aldrin	3.6E-03	3.6E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E+01	3.0E-05	NA	NA	NA	NA
BHC, alpha-	2.1E-03	9.8E-04	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E+00	3.0E-03	NA	NA	NA	NA
BHC, beta-	6.2E-03	4.2E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00	3.0E-03	NA	NA	NA	NA
Chlordane, alpha	1.4E-02	1.3E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+00	6.0E-05	NA	NA	NA	NA
Chlordane, gamma-	1.1E-02	7.6E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+00	6.0E-05	NA	NA	NA	NA
DDD, 4,4'-	2.1E-02	3.2E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01	5.0E-04	NA	NA	NA	NA
DDE, 4,4'-	1.6E-02	8.9E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01	5.0E-04	NA	NA	NA	NA
DDT, 4,4'-	1.6E-02	6.6E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01	5.0E-04	NA	NA	NA	NA
Dieldrin	5.8E-03	1.2E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E+01	5.0E-05	NA	NA	NA	NA
Endosulfan II	1.2E-02	7.2E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	6.0E-03	NA	NA	NA	NA
Endrin	5.6E-03	1.7E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-04	NA	NA	NA	NA
Aroclor-1260	2.4E-01	1.7E+00	0.06	2.0E-09	1.4E-08	1.4E-07	1.0E-06	7.7E+00	NA	2E-08	1E-07	NA	NA

(a) Subsurface soil concentrations

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	2E-08	1E-07	3E-04	6E-03

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x CR x RAF x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Unit Conversion (UC) = 1E-06 kg/mg
Dermal Contact Rate (CR) = 1000 mg/d
Relative Absorption Factor (RAF) = CS Constituent-specific (--)
Exposure Frequency (EF) = 250 d/yr
Exposure Duration (ED) = 1 yr
Body Weight (BW) = 70 kg
Averaging Time (AT) = 25550 d (cancer)
365 d (noncancer)

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION (ADULT WORKERS)
EXPOSURE AND RISK ESTIMATES
INHALATION OF PARTICULATES
NCBC DAVISVILLE - SITE 09

	Soil Concentrations (a)		Exposure Estimates				Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Inhalation) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Inhalation) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS												
Antimony	1.3E+01	9.0E+01	3.0E-10	2.0E-09	2.1E-08	1.4E-07	NA	4.0E-04	NA	NA	5E-05	4E-04
Arsenic	3.1E+00	1.4E+01	6.9E-11	3.0E-10	4.9E-09	2.1E-08	5.0E+01	3.0E-04	3E-09	2E-08	2E-05	7E-05
Barium	5.5E+01	6.8E+02	1.2E-09	1.5E-08	8.6E-08	1.1E-06	NA	1.0E-03	NA	NA	9E-05	1E-03
Beryllium	1.1E+00	5.6E+00	2.5E-11	1.2E-10	1.8E-09	8.7E-09	8.4E+00	5.0E-03	2E-10	1E-09	4E-07	2E-06
Cadmium	3.5E+00	5.6E+01	7.7E-11	1.3E-09	5.4E-09	8.8E-08	6.3E+00	5.0E-04	5E-10	8E-09	1E-05	2E-04
Chromium III	1.7E+01	1.3E+02	3.7E-10	3.0E-09	2.6E-08	2.1E-07	NA	1.0E+00	NA	NA	3E-08	2E-07
Chromium VI	2.4E+00	1.9E+01	5.3E-11	4.3E-10	3.7E-09	3.0E-08	4.1E+01	2.0E-02	2E-09	2E-08	2E-07	2E-06
Cobalt	8.9E+00	2.6E+01	2.0E-10	5.9E-10	1.4E-08	4.1E-08	NA	NA	NA	NA	NA	NA
Copper	1.0E+02	2.8E+03	2.2E-09	6.1E-08	1.6E-07	4.3E-06	NA	NA	NA	NA	NA	NA
Lead	1.3E+02	2.1E+03	2.8E-09	4.7E-08	2.0E-07	3.3E-06	NA	NA	NA	NA	NA	NA
Manganese	1.9E+02	1.3E+03	4.2E-09	2.8E-08	3.0E-07	2.0E-06	NA	1.1E-04	NA	NA	3E-03	2E-02
Mercury	2.3E-01	1.7E+00	5.1E-12	3.8E-11	3.6E-10	2.7E-09	NA	8.6E-05	NA	NA	4E-06	3E-05
Nickel	3.0E+01	2.3E+02	6.8E-10	5.1E-09	4.7E-08	3.5E-07	8.4E-01	2.0E-02	6E-10	4E-09	2E-06	2E-05
Silver	1.5E+00	3.5E+01	3.2E-11	7.8E-10	2.3E-09	5.4E-08	NA	5.0E-03	NA	NA	5E-07	1E-05
Thallium	6.0E-01	6.9E-01	1.3E-11	1.5E-11	9.4E-10	1.1E-09	NA	8.0E-04	NA	NA	1E-06	1E-06
Vanadium	2.3E+01	8.2E+02	5.1E-10	1.8E-08	3.6E-08	1.3E-06	NA	7.0E-03	NA	NA	5E-06	2E-04
Zinc	3.3E+02	3.1E+03	7.5E-09	6.9E-08	5.2E-07	4.8E-06	NA	3.0E-01	NA	NA	2E-06	2E-05
VOLATILES												
Acetone	4.7E-02	5.9E+01	1.1E-12	1.3E-09	7.4E-11	9.2E-08	NA	1.0E+00	NA	NA	7E-11	9E-08
Benzene	1.3E-02	1.5E+00	2.9E-13	3.3E-11	2.0E-11	2.3E-09	2.9E-02	NA	8E-15	1E-12	NA	NA
Butanone, 2-	2.0E-02	1.8E+02	4.4E-13	4.0E-09	3.1E-11	2.8E-07	NA	2.9E-01	NA	NA	1E-10	1E-06
Chlorobenzene	1.6E-02	1.8E-01	3.5E-13	4.0E-12	2.5E-11	2.8E-10	NA	5.0E-03	NA	NA	5E-09	6E-08
Chloroform	7.7E-03	2.0E-03	1.7E-13	4.5E-14	1.2E-11	3.1E-12	8.1E-02	1.0E-02	1E-14	4E-15	1E-09	3E-10
Ethylbenzene	1.5E-02	9.1E+02	3.4E-13	2.0E-08	2.4E-11	1.4E-06	NA	2.9E-01	NA	NA	8E-11	5E-06
Tetrachloroethene	1.3E-02	2.0E-03	3.0E-13	4.5E-14	2.1E-11	3.1E-12	2.0E-03	1.0E-01	6E-16	9E-17	2E-10	3E-11
Toluene	1.4E-02	1.5E+04	3.2E-13	3.3E-07	2.2E-11	2.3E-05	NA	1.1E-01	NA	NA	2E-10	2E-04
Trichloroethene	1.0E-02	3.8E+00	2.3E-13	8.5E-11	1.6E-11	5.9E-09	6.0E-03	NA	1E-15	5E-13	NA	NA
Xylenes (Total)	2.4E-02	4.2E+03	5.3E-13	9.4E-08	3.7E-11	6.6E-06	NA	NA	NA	NA	NA	NA
SEMIVOLATILES												
Acenaphthene	4.6E-01	4.7E+01	1.0E-11	3.8E-10	7.1E-10	2.7E-08	NA	6.0E-01	NA	NA	1E-09	4E-08
Acenaphthylene	3.1E-01	5.1E-02	6.9E-12	1.1E-12	4.8E-10	8.0E-11	NA	NA	NA	NA	NA	NA
Anthracene	5.1E-01	2.3E+01	1.1E-11	5.1E-10	8.0E-10	3.6E-08	NA	3.0E+00	NA	NA	3E-10	1E-08
Benzo(a)anthracene	1.1E+00	4.1E+01	2.4E-11	9.1E-10	1.6E-09	6.4E-08	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	9.6E-01	2.2E+01	2.1E-11	4.9E-10	1.5E-09	3.4E-08	NA	NA	NA	NA	NA	NA
Benzo(b/k)fluoranthene	2.1E+00	8.2E+01	4.7E-11	1.8E-09	3.3E-09	1.3E-07	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	6.3E-01	1.5E+01	1.4E-11	3.3E-10	9.8E-10	2.3E-08	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	1.0E+00	3.3E+01	2.3E-11	7.4E-10	1.6E-09	5.1E-08	1.4E-02	NA	3E-13	1E-11	NA	NA
Butyl benzyl phthalate	5.1E-01	8.3E+00	1.1E-11	1.9E-10	8.0E-10	1.3E-08	NA	2.0E+00	NA	NA	4E-10	6E-09
Carbazole	6.3E-01	1.0E+01	1.4E-11	2.2E-10	9.8E-10	1.6E-08	NA	NA	NA	NA	NA	NA
Chrysene	1.0E+00	2.1E+01	2.3E-11	4.7E-10	1.6E-09	3.3E-08	NA	NA	NA	NA	NA	NA
Dibenzofuran	4.6E-01	1.2E+01	1.0E-11	2.7E-10	7.1E-10	1.9E-08	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	5.4E-01	6.4E+00	1.2E-11	1.4E-10	8.4E-10	1.0E-08	NA	NA	NA	NA	NA	NA
Dichlorobenzene, 1,2-	6.3E-01	4.3E+00	1.4E-11	9.6E-11	9.8E-10	6.7E-09	NA	NA	NA	NA	NA	NA
Dichlorobenzene, 1,4-	5.5E-01	8.4E-01	1.2E-11	1.9E-11	8.5E-10	1.3E-09	NA	2.2E-01	NA	NA	4E-09	6E-09
Diethyl phthalate	3.2E-01	4.4E-02	7.1E-12	9.8E-13	4.9E-10	6.9E-11	NA	8.0E+00	NA	NA	6E-11	9E-12
Di-n-butyl phthalate	4.4E-01	1.3E+00	9.7E-12	2.9E-11	6.8E-10	2.0E-09	NA	1.0E+00	NA	NA	7E-10	2E-09
Fluoranthene	1.8E+00	9.4E+01	3.9E-11	2.1E-09	2.7E-09	1.5E-07	NA	4.0E-01	NA	NA	7E-09	4E-07
Fluorene	4.5E-01	1.8E+01	1.0E-11	4.0E-10	7.1E-10	2.8E-08	NA	4.0E-01	NA	NA	2E-09	7E-08
Indeno(1,2,3-cd)pyrene	5.9E-01	1.5E+01	1.3E-11	3.3E-10	9.2E-10	2.3E-08	NA	NA	NA	NA	NA	NA

TABLE D-1 (cont.)
SCENARIO 1 – FUTURE CONSTRUCTION WORKER (ADULTS AGED 18 TO 70 YEARS)
EXPOSURE AND RISK ESTIMATES
INHALATION OF PARTICULATES (cont)
NCBC DAVISVILLE – SITE 09

Constituent	Soil Concentrations (a) Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Exposure Estimates Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Toxicity Values Cancer Slope Factor (Inhalation) (mg/kg-d)^-1	Noncancer Reference Dose (Inhalation) (mg/kg-d)	Risk Estimates Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
SEMIVOLATILES (cont)												
Methylnaphthalene, 2-	7.1E-01	5.0E+00	1.6E-11	1.1E-10	1.1E-09	7.8E-09	NA	NA	NA	NA	NA	NA
Methylphenol, 4-	3.2E-01	2.8E-01	7.2E-12	6.2E-12	5.1E-10	4.4E-10	NA	5.0E-02	NA	NA	1E-08	9E-09
Naphthalene	5.4E-01	1.9E+01	1.2E-11	4.2E-10	8.5E-10	3.0E-08	NA	4.0E-02	NA	NA	2E-08	7E-07
Phenanthrene	1.4E+00	1.1E+02	3.1E-11	2.5E-09	2.1E-09	1.7E-07	NA	NA	NA	NA	NA	NA
Pyrene	1.4E+00	8.1E+01	3.2E-11	1.8E-09	2.2E-09	1.3E-07	NA	3.0E-01	NA	NA	7E-09	4E-07
PESTICIDES/PCBs												
Aldrin	3.6E-03	3.6E-03	8.0E-14	8.0E-14	5.6E-12	5.6E-12	1.7E+01	3.0E-05	1E-12	1E-12	2E-07	2E-07
BHC, alpha-	2.1E-03	9.8E-04	4.8E-14	2.2E-14	3.4E-12	1.5E-12	6.3E+00	NA	3E-13	1E-13	NA	NA
BHC, beta-	6.2E-03	4.2E-02	1.4E-13	9.4E-13	9.7E-12	6.6E-11	1.8E+00	NA	2E-13	2E-12	NA	NA
Chlordane, alpha	1.4E-02	1.3E-02	3.2E-13	2.9E-13	2.2E-11	2.0E-11	1.3E+00	6.0E-05	4E-13	4E-13	4E-07	3E-07
Chlordane, gamma-	1.1E-02	7.6E-03	2.5E-13	1.7E-13	1.7E-11	1.2E-11	1.3E+00	6.0E-05	3E-13	2E-13	3E-07	2E-07
DDD, 4,4'-	2.1E-02	3.2E-01	4.6E-13	7.1E-12	3.3E-11	5.0E-10	2.4E-01	NA	1E-13	2E-12	NA	NA
DDE, 4,4'-	1.6E-02	8.9E-01	3.6E-13	2.0E-11	2.5E-11	1.4E-09	3.4E-01	NA	1E-13	7E-12	NA	NA
DDT, 4,4'-	1.6E-02	6.6E-02	3.6E-13	1.5E-12	2.5E-11	1.0E-10	3.4E-01	5.0E-04	1E-13	5E-13	5E-08	2E-07
Dieldrin	5.8E-03	1.2E-02	1.3E-13	2.7E-13	9.0E-12	1.9E-11	1.6E+01	5.0E-05	2E-12	4E-12	2E-07	4E-07
Endosulfan II	1.2E-02	7.2E-02	2.7E-13	1.6E-12	1.9E-11	1.1E-10	NA	6.0E-03	NA	NA	3E-09	2E-08
Endrin	5.6E-03	1.7E-03	1.3E-13	3.8E-14	8.8E-12	2.7E-12	NA	3.0E-04	NA	NA	3E-08	9E-09
Aroclor-1260	2.4E-01	1.7E+00	5.4E-12	3.8E-11	3.8E-10	2.7E-09	7.7E+00	NA	4E-11	3E-10	NA	NA

(a) Subsurface soil concentrations

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	7E-09	5E-08	3E-03	2E-02

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x TSP x IR x RAF x ET x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Dust Concentration (TSP) =	8.0E-09 kg/m3
Inhalation Rate (IR) =	2.5 m3/hr
Relative Absorption Factor (RAF) =	1 for all constituents (--)
Exposure Time (ET) =	8 hr/d
Exposure Frequency (EF) =	250 d/yr
Exposure Duration (ED) =	1 yr
Body Weight (BW) =	70 kg
Averaging Time (AT) =	25550 d (cancer)
	365 d (noncancer)

TABLE D-1 (cont.)
SCENARIO 1 – FUTURE CONSTRUCTION (ADULT WORKERS)
EXPOSURE AND RISK ESTIMATES
INHALATION OF AIRBORNE (VAPOR PHASE) CONSTITUENTS IN AIR
NCBC DAVISVILLE – SITE 09

Constituent	Air Concentrations (a)		Exposure Estimates				Toxicity Values		Risk Estimates			
	Arithmetic Mean Air Concentration (mg/m3)	Maximum Air Concentration (mg/m3)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Inhalation) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Inhalation) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS												
Antimony	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-04	NA	NA	NA	NA
Arsenic	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.0E+01	3.0E-04	NA	NA	NA	NA
Barium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E-03	NA	NA	NA	NA
Beryllium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.4E+00	5.0E-03	NA	NA	NA	NA
Cadmium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E+00	5.0E-04	NA	NA	NA	NA
Chromium III (a)	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E+00	NA	NA	NA	NA
Chromium VI (a)	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.1E+01	2.0E-02	NA	NA	NA	NA
Cobalt	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Copper	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Lead	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.1E-04	NA	NA	NA	NA
Mercury	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.6E-05	NA	NA	NA	NA
Nickel	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.4E-01	2.0E-02	NA	NA	NA	NA
Silver	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Thallium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.0E-04	NA	NA	NA	NA
Vanadium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	7.0E-03	NA	NA	NA	NA
Zinc	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-01	NA	NA	NA	NA
VOLATILES												
Acetone	9.7E-05	1.2E-01	2.7E-07	3.4E-04	1.9E-05	2.4E-02	NA	1.0E+00	NA	NA	2E-05	2E-02
Benzene	1.4E-05	1.5E-03	3.8E-08	4.3E-06	2.6E-06	3.0E-04	2.9E-02	NA	1E-09	1E-07	NA	NA
Butanone, 2-	1.2E-05	1.1E-01	3.3E-08	2.9E-04	2.3E-06	2.1E-02	NA	2.9E-01	NA	NA	8E-06	7E-02
Chlorobenzene	4.4E-06	5.0E-05	1.2E-08	1.4E-07	8.6E-07	9.8E-06	NA	5.0E-03	NA	NA	2E-04	2E-03
Chloroform	9.2E-06	2.4E-06	2.6E-08	6.7E-09	1.8E-06	4.7E-07	8.1E-02	1.0E-02	2E-09	5E-10	2E-04	5E-05
Ethylbenzene	8.7E-06	5.1E-01	2.4E-08	1.4E-03	1.7E-06	1.0E-01	NA	2.9E-01	NA	NA	6E-06	3E-01
Tetrachloroethene	1.7E-05	2.5E-06	4.6E-08	6.9E-09	3.2E-06	4.8E-07	2.0E-03	1.0E-01	9E-11	1E-11	3E-05	5E-06
Toluene	8.6E-06	9.0E+00	2.4E-08	2.5E-02	1.7E-06	1.8E+00	NA	1.1E-01	NA	NA	2E-05	2E+01
Trichloroethene	1.7E-05	6.3E-03	4.7E-08	1.8E-05	3.3E-06	1.2E-03	6.0E-03	NA	3E-10	1E-07	NA	NA
Xylenes (Total)	3.1E-06	5.4E-01	8.5E-09	1.5E-03	6.0E-07	1.1E-01	NA	NA	NA	NA	NA	NA
SEMIVOLATILES												
Acenaphthene	6.5E-05	2.4E-03	1.8E-07	6.7E-06	1.3E-05	4.7E-04	NA	6.0E-01	NA	NA	2E-05	8E-04
Acenaphthylene	7.8E-08	1.3E-08	2.2E-10	3.6E-11	1.5E-08	2.5E-09	NA	NA	NA	NA	NA	NA
Anthracene	2.2E-08	9.9E-07	6.1E-11	2.8E-09	4.3E-09	1.9E-07	NA	3.0E+00	NA	NA	1E-09	6E-08
Benzo(a)anthracene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Benzo(b/k)fluoranthene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02	NA	NA	NA	NA	NA
Butyl benzyl phthalate	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E+00	NA	NA	NA	NA
Carbazole	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Dichlorobenzene, 1,2-	2.8E-05	1.9E-04	7.8E-08	5.4E-07	5.5E-06	3.7E-05	NA	NA	NA	NA	NA	NA
Dichlorobenzene, 1,4-	1.9E-04	2.9E-04	5.3E-07	8.1E-07	3.7E-05	5.7E-05	NA	2.2E-01	NA	NA	2E-04	3E-04
Diethyl phthalate	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.0E+00	NA	NA	NA	NA
Di-n-butyl phthalate	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E+00	NA	NA	NA	NA
Fluoranthene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-01	NA	NA	NA	NA
Fluorene	1.1E-07	4.2E-06	3.0E-10	1.2E-08	2.1E-08	8.2E-07	NA	4.0E-01	NA	NA	5E-08	2E-06
Indeno(1,2,3-cd)pyrene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION
EXPOSURE AND RISK ESTIMATES
INHALATION OF AIRBORNE (VAPOR PHASE) CONSTITUENTS IN AIR
NCBC DAVISVILLE - SITE 09

Constituent	Air Concentrations (a) Arithmetic Mean Air Concentration (mg/m3)	Maximum Air Concentration (mg/m3)	Exposure Estimates Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Toxicity Values Cancer Slope Factor (Inhalation) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Inhalation) (mg/kg-d)	Risk Estimates Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
SEMIVOLATILES (cont)												
Methylnaphthalene, 2-	4.9E-07	3.5E-06	1.4E-09	9.7E-09	9.5E-08	6.8E-07	NA	NA	NA	NA	NA	NA
Methylphenol, 4-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-02	NA	NA	NA	NA
Naphthalene	2.0E-06	7.0E-05	5.6E-09	2.0E-07	3.9E-07	1.4E-05	NA	4.0E-02	NA	NA	1E-05	3E-04
Phenanthrene	2.4E-08	1.9E-06	6.8E-11	5.4E-09	4.7E-09	3.8E-07	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-01	NA	NA	NA	NA
PESTICIDES/PCBs												
Aldrin	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E+01	3.0E-05	NA	NA	NA	NA
BHC, alpha	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E+00	NA	NA	NA	NA	NA
BHC, beta-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00	NA	NA	NA	NA	NA
Chlordane, alpha	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+00	6.0E-05	NA	NA	NA	NA
Chlordane, gamma-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+00	6.0E-05	NA	NA	NA	NA
DDD, 4,4'-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01	NA	NA	NA	NA	NA
DDE, 4,4'-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01	NA	NA	NA	NA	NA
DDT, 4,4'-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01	5.0E-04	NA	NA	NA	NA
Dieldrin	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E+01	5.0E-05	NA	NA	NA	NA
Endosulfan II	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	6.0E-03	NA	NA	NA	NA
Endrin	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-04	NA	NA	NA	NA
Aroclor-1260	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.7E+00	NA	NA	NA	NA	NA

(a) Based on measured soil gas concentrations

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	4E-09	2E-07	6E-04	2E+01

[shaded] = Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x IR x RAF x ET x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Inhalation Rate (IR) =	2.5 m3/hr
Relative Absorption Factor (RAF) =	1 for all constituents (--)
Exposure Time (ET) =	8 hr/d
Exposure Frequency (EF) =	250 d/yr
Exposure Duration (ED) =	1 yr
Body Weight (BW) =	70 kg
Averaging Time (AT) =	25550 d (cancer)
	365 d (noncancer)

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION (ADULT WORKERS)
ESTIMATE OF SOIL GAS FLUX FROM SOIL
NCBC DAVISVILLE - SITE 09

Constituent	Soil Concentration (a)		Constituent-Specific Constants			Flux Estimates	
	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Henry's Law Constant (H') (--)	Organic Carbon/Water Partition Coeficient (koc) (--)	Vapor Diffusion Coefficient In Air (Da) (cm2/s)	Mean Flux due to Soil (g/s*cm2)	RME Flux due to Soil (g/s*cm2)
INORGANICS							
Antimony	1.3E+01	9.0E+01	NA	NA	NA	NA	NA
Arsenic	3.1E+00	1.4E+01	NA	NA	NA	NA	NA
Barium	5.5E+01	6.8E+02	NA	NA	NA	NA	NA
Beryllium	1.1E+00	5.6E+00	NA	NA	NA	NA	NA
Cadmium	3.5E+00	5.6E+01	NA	NA	NA	NA	NA
Chromium III (a)	1.7E+01	1.3E+02	NA	NA	NA	NA	NA
Chromium VI (a)	2.4E+00	1.9E+01	NA	NA	NA	NA	NA
Cobalt	8.9E+00	2.6E+01	NA	NA	NA	NA	NA
Copper	1.0E+02	2.8E+03	NA	NA	NA	NA	NA
Lead	1.3E+02	2.1E+03	NA	NA	NA	NA	NA
Manganese	1.9E+02	1.3E+03	NA	NA	NA	NA	NA
Mercury	2.3E-01	1.7E+00	4.7E-01	NA	NA	NA	NA
Nickel	3.0E+01	2.3E+02	NA	NA	NA	NA	NA
Silver	1.5E+00	3.5E+01	NA	NA	NA	NA	NA
Thallium	6.0E-01	6.9E-01	NA	NA	NA	NA	NA
Vanadium	2.3E+01	8.2E+02	NA	NA	NA	NA	NA
Zinc	3.3E+02	3.1E+03	NA	NA	NA	NA	NA
VOLATILES							
Acetone	4.7E-02	5.9E+01	1.8E-03	3.7E-01	1.0E-01	3.7E-13	4.7E-10
Benzene	1.3E-02	1.5E+00	2.3E-01	8.1E+01	8.7E-02	5.2E-14	6.0E-12
Butanone, 2-	2.0E-02	1.8E+02	1.9E-03	1.2E+00	8.9E-02	4.5E-14	4.1E-10
Chlorobenzene	1.6E-02	1.8E-01	1.6E-01	1.9E+02	7.7E-02	1.7E-14	1.9E-13
Chloroform	7.7E-03	2.0E-03	1.4E-01	4.4E+01	8.8E-02	3.5E-14	9.2E-15
Ethylbenzene	1.5E-02	9.1E+02	3.3E-01	1.8E+02	7.1E-02	3.4E-14	2.0E-09
Tetrachloroethene	1.3E-02	2.0E-03	1.1E+00	2.8E+02	7.4E-02	6.4E-14	9.5E-15
Toluene	1.4E-02	1.5E+04	2.5E-01	1.3E+02	7.8E-02	3.3E-14	3.5E-08
Trichloroethene	1.0E-02	3.8E+00	4.9E-01	9.9E+01	8.1E-02	6.5E-14	2.4E-11
Xylenes (Total)	2.4E-02	4.2E+03	2.8E-01	6.4E+02	7.1E-02	1.2E-14	2.1E-09
SEMIVOLATILES							
Acenaphthene	4.6E-01	1.7E+01	1.0E-02	1.8E+01	6.0E-02	2.5E-13	9.3E-12
Acenaphthylene	3.1E-01	5.1E-02	4.7E-03	4.8E+03	6.1E-02	3.0E-16	4.9E-17
Anthracene	5.1E-01	2.3E+01	3.6E-03	2.0E+04	5.8E-02	8.4E-17	3.8E-15
Benzo(a)anthracene	1.1E+00	4.1E+01	2.7E-05	1.4E+06	NA	NA	NA
Benzo(a)pyrene	9.6E-01	2.2E+01	2.0E-05	1.2E+06	NA	NA	NA
Benzo(b/k)fluoranthene	2.1E+00	8.2E+01	5.0E-04	5.5E+05	NA	NA	NA
Benzo(ghi)perylene	6.3E-01	1.5E+01	5.8E-06	7.8E+06	NA	NA	NA
Bis(2-ethylhexyl)phthalate	1.0E+00	3.3E+01	1.2E-05	1.0E+05	NA	NA	NA
Butyl benzyl phthalate	5.1E-01	8.3E+00	5.4E-05	2.1E+02	NA	NA	NA
Carbazole	6.3E-01	1.0E+01	NA	NA	NA	NA	NA
Chrysene	1.0E+00	2.1E+01	4.4E-05	2.5E+05	NA	NA	NA
Dibenzofuran	4.6E-01	1.2E+01	NA	1.0E+04	NA	NA	NA
Dibenzo(a,h)anthracene	5.4E-01	6.4E+00	3.0E-07	1.7E+06	NA	NA	NA
Dichlorobenzene, 1,2-	6.3E-01	4.3E+00	1.0E-01	6.6E+02	7.1E-02	1.1E-13	7.4E-13
Dichlorobenzene, 1,4-	5.5E-01	8.4E-01	1.9E-01	1.6E+02	7.1E-02	7.3E-13	1.1E-12
Diethyl phthalate	3.2E-01	4.4E-02	3.5E-05	6.9E+01	NA	NA	NA
Di-n-butyl phthalate	4.4E-01	1.3E+00	2.6E-03	1.4E+03	NA	NA	NA
Fluoranthene	1.8E+00	9.4E+01	2.7E-04	4.2E+04	NA	NA	NA
Fluorene	4.5E-01	1.8E+01	4.9E-03	5.0E+03	5.8E-02	4.1E-16	1.6E-14
Indeno(1,2,3-cd)pyrene	5.9E-01	1.5E+01	2.9E-06	3.1E+07	NA	NA	NA

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION
ESTIMATE OF SOIL GAS FLUX FROM SOIL
NCBC DAVISVILLE - SITE 09

Constituent	Soil Concentration (a) Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Constituent-Specific Constants Henry's Law Constant (H') (--)	Organic Carbon/Water Partition Coeficient (koc) (--)	Vapor Diffusion Coefficient In Air (Da) (cm2/s)	Flux Estimates Mean Flux due to Soil (g/s*cm2)	RME Flux due to Soil (g/s*cm2)
SEMIVOLATILES (cont)							
Methylnaphthalene, 2-	7.1E-01	5.0E+00	2.1E-02	8.0E+03	6.4E-02	1.9E-15	1.3E-14
Methylphenol, 4-	3.2E-01	2.8E-01	1.6E-05	4.9E+01	NA	NA	NA
Naphthalene	5.4E-01	1.9E+01	2.0E-02	1.6E+03	6.8E-02	7.7E-15	2.7E-13
Phenanthrene	1.4E+00	1.1E+02	1.6E-03	2.2E+04	5.8E-02	9.3E-17	7.5E-15
Pyrene	1.4E+00	8.1E+01	2.1E-04	7.3E+04	NA	NA	NA
PESTICIDES/PCBs							
Aldrin	3.6E-03	3.6E-03	2.1E-02	4.1E+02	NA	NA	NA
BHC, alpha	2.1E-03	9.8E-04	2.2E-04	1.9E+03	NA	NA	NA
BHC, beta-	6.2E-03	4.2E-02	9.6E-06	2.9E+03	NA	NA	NA
Chlordane, alpha	1.4E-02	1.3E-02	2.0E-03	3.3E+05	NA	NA	NA
Chlordane, gamma-	1.1E-02	7.6E-03	NA	6.5E+05	NA	NA	NA
DDD, 4,4'-	2.1E-02	3.2E-01	9.0E-04	4.4E+04	NA	NA	NA
DDE, 4,4'-	1.6E-02	8.9E-01	9.7E-04	6.2E+05	NA	NA	NA
DDT, 4,4'-	1.6E-02	6.6E-02	1.6E-03	4.6E+05	NA	NA	NA
Dieldrin	5.8E-03	1.2E-02	2.5E-03	2.4E+04	NA	NA	NA
Endosulfan II	1.2E-02	7.2E-02	7.9E-04	3.4E+03	NA	NA	NA
Endrin	5.6E-03	1.7E-03	1.7E-05	8.3E+03	NA	NA	NA
Aroclor-1260	2.4E-01	1.7E+00	3.0E-01	2.6E+06	NA	NA	NA

(a) Subsurface soil concentrations

Where:

J_{soil} = [Dt x SG_{soil}] / r

Dt = [Da x $Pa^{10/3}$] / $[Pt]^2$

SG_{soil} = [Concentration x UC1 x UC2 x H'] / [koc x foc]

H' = H / (R * T)

Flux from Soil (J_{soil}) =	CS g/s*cm2
Porous Media Diffusion Coefficient (Dt) =	CS cm2/s
Soil Gas from Soil (SG_{soil})	CS g/cm3
Radius (zone of influence) (r) =	363 cm
Vapor Diffusion Coefficient in Air Da) =	CS cm2/s
Air Filled Porosity of Soil (Pa)	0.28 (--)
Total Soil Porosity (Pt) =	0.43 (--)
Unit Conversion for Soil Density(UC1) =	1.5E-03 kg/cm3
Unit Conversion (UC2) =	1E-03 g/mg
Dimensionless Henry's Law Constant (H') =	CS (--)
Organic Carbon Water Partition Coefficient (koc) =	CS (--)
Fraction Organic Carbon (foc) =	0.02 (--)
Henry's Law Constant (H) =	CS atm*m3/mol
Universal Gas Constant (R) =	8.2E-05 atm*m3/mol*K
Temperature (T) =	293 K

TABLE D-1 (cont.)
SCENARIO 1 - FUTURE CONSTRUCTION (ADULT WORKERS)
ESTIMATE OF AMBIENT AIR CONCENTRATION
NCBC DAVISVILLE - SITE 09

Constituent	Flux Estimates Mean FLux (J) (g/s*cm2)	Flux Estimates RME FLux (J) (g/s*cm2)	Mean Ambient Air Concentration ($C_{ambient}$) (mg/m3)	RME Ambient Air Concentration ($C_{ambient}$) (mg/m3)
INORGANICS				
Antimony	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA
Barium	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA
Chromium III (a)	NA	NA	NA	NA
Chromium VI (a)	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA
Copper	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Manganese	NA	NA	NA	NA
Mercury	NA	NA	NA	NA
Nickel	NA	NA	NA	NA
Silver	NA	NA	NA	NA
Thallium	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
VOLATILES				
Acetone	3.7E-13	4.7E-10	9.7E-05	1.2E-01
Benzene	5.2E-14	6.0E-12	1.4E-05	1.5E-03
Butanone, 2-	4.5E-14	4.1E-10	1.2E-05	1.1E-01
Chlorobenzene	1.7E-14	1.9E-13	4.4E-06	5.0E-05
Chloroform	3.5E-14	9.2E-15	9.2E-06	2.4E-06
Ethylbenzene	3.4E-14	2.0E-09	8.7E-06	5.1E-01
Tetrachloroethene	6.4E-14	9.5E-15	1.7E-05	2.5E-06
Toluene	3.3E-14	3.5E-08	8.6E-06	9.0E+00
Trichloroethene	6.5E-14	2.4E-11	1.7E-05	6.3E-03
Xylenes (Total)	1.2E-14	2.1E-09	3.1E-06	5.4E-01
SEMIVOLATILES				
Acenaphthene	2.5E-13	9.3E-12	6.5E-05	2.4E-03
Acenaphthylene	3.0E-16	4.9E-17	7.8E-08	1.3E-08
Anthracene	8.4E-17	3.8E-15	2.2E-08	9.9E-07
Benzo(a)anthracene	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Benzo(b/k)fluoranthene	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA
Butyl benzyl phthalate	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA
Dichlorobenzene, 1,2-	1.1E-13	7.4E-13	2.8E-05	1.9E-04
Dichlorobenzene, 1,4-	7.3E-13	1.1E-12	1.9E-04	2.9E-04
Diethyl phthalate	NA	NA	NA	NA
Di-n-butyl phthalate	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA
Fluorene	4.1E-16	1.6E-14	1.1E-07	4.2E-06
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA

TABLE D-1 (cont.)
SCENARIO 1 – FUTURE CONSTRUCTION
ESTIMATE OF AMBIENT AIR CONCENTRATION
NCBC DAVISVILLE – SITE 09

Constituent	Flux Estimates: Mean FLux (J) (g/s*cm2)	Flux Estimates: RME FLux (J) (g/s*cm2)	Mean Ambient Air Concentration ($C_{ambient}$) (mg/m3)	RME Ambient Air Concentration ($C_{ambient}$) (mg/m3)
SEMIVOLATILES (cont)				
Methylnaphthalene, 2-	1.9E-15	1.3E-14	4.9E-07	3.5E-06
Methylphenol, 4-	NA	NA	NA	NA
Naphthalene	7.7E-15	2.7E-13	2.0E-06	7.0E-05
Phenanthrene	9.3E-17	7.5E-15	2.4E-08	1.9E-06
Pyrene	NA	NA	NA	NA
PESTICIDES/PCBs				
Aldrin	NA	NA	NA	NA
BHC, alpha	NA	NA	NA	NA
BHC, beta-	NA	NA	NA	NA
Chlordane, alpha	NA	NA	NA	NA
Chlordane, gamma-	NA	NA	NA	NA
DDD, 4,4'-	NA	NA	NA	NA
DDE, 4,4'-	NA	NA	NA	NA
DDT, 4,4'-	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA
Endrin	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA

Where:

$C_{ambient}$ = (J x A x UC1 x UC2) / (L x DH x WS)

Ambient Air Concentration ($C_{ambient}$) = CS mg/m3
Flux (J) = CS g/s*cm2
Area of Site (A) = 6.1E+08 cm2
Unit Conversion (UC1) = 1E+03 mg/g
Unit Conversion (UC2) = 1E+06 cm3/m3
Effective Length of Site (L) = 2.5E+04 cm
Diffusion Height (DH) = 200 cm
Wind Speed (WS) = 474 cm/s

TABLE D-2
SCENARIO 2 – FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
INCIDENTAL INGESTION OF SOIL
NCBC DAVISVILLE – SITE 09

	Soil Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Aluminum	5.7E+03	3.8E+04	1	9.6E-04	6.3E-03	4.2E-03	2.8E-02	NA	NA	NA	NA	NA	NA
Antimony	1.2E+01	6.5E+01	1	1.9E-06	1.1E-05	8.4E-06	4.7E-05	NA	4.0E-04	NA	NA	2E-02	1E-01
Arsenic	2.6E+00	3.3E+01	1	4.4E-07	5.4E-06	1.9E-06	2.4E-05	1.8E+00	3.0E-04	8E-07	9E-06	6E-03	8E-02
Barium	3.6E+01	1.2E+03	1	6.0E-06	2.0E-04	2.6E-05	8.7E-04	NA	7.0E-02	NA	NA	4E-04	1E-02
Beryllium	1.1E+00	7.5E+01	1	1.8E-07	1.3E-05	8.0E-07	5.5E-05	4.3E+00	5.0E-03	8E-07	5E-05	2E-04	1E-02
Cadmium	1.7E+00	1.7E+02	1	2.8E-07	2.9E-05	1.2E-06	1.3E-04	NA	1.0E-03	NA	NA	1E-03	1E-01
Chromium III	1.9E+01	8.4E+02	1	3.1E-06	1.4E-04	1.3E-05	6.1E-04	NA	1.0E+00	NA	NA	1E-05	6E-04
Chromium VI	2.6E+00	1.2E+02	1	4.4E-07	2.0E-05	1.9E-06	8.7E-05	NA	5.0E-03	NA	NA	4E-04	2E-02
Cobalt	9.4E+00	4.3E+02	1	1.6E-06	7.2E-05	6.8E-06	3.1E-04	NA	NA	NA	NA	NA	NA
Copper	9.6E+01	2.5E+04	1	1.6E-05	4.1E-03	6.9E-05	1.8E-02	NA	3.7E-02	NA	NA	2E-03	5E-01
Lead	1.1E+02	8.7E+03	0.4	7.0E-06	5.8E-04	3.1E-05	2.5E-03	NA	NA	NA	NA	NA	NA
Manganese	1.9E+02	2.9E+03	1	3.2E-05	4.9E-04	1.4E-04	2.1E-03	NA	1.4E-01	NA	NA	1E-03	2E-02
Mercury	2.1E-01	2.8E+00	1	3.5E-08	4.7E-07	1.6E-07	2.0E-06	NA	3.0E-04	NA	NA	5E-04	7E-03
Nickel	2.9E+01	4.2E+03	1	4.8E-06	7.0E-04	2.1E-05	3.1E-03	NA	2.0E-02	NA	NA	1E-03	2E-01
Selenium	9.4E-01	3.2E+00	1	1.6E-07	5.3E-07	6.8E-07	2.3E-06	NA	5.0E-03	NA	NA	1E-04	5E-04
Silver	7.5E-01	3.3E+01	1	1.3E-07	5.5E-06	5.5E-07	2.4E-05	NA	5.0E-03	NA	NA	1E-04	5E-03
Vanadium	1.8E+01	1.3E+02	1	3.0E-06	2.2E-05	1.3E-05	9.7E-05	NA	7.0E-03	NA	NA	2E-03	1E-02
Zinc	2.8E+02	3.4E+04	1	4.7E-05	5.7E-03	2.1E-04	2.5E-02	NA	3.0E-01	NA	NA	7E-04	8E-02
VOLATILES													
Acetone	1.7E-02	1.1E-01	1	2.9E-09	1.8E-08	1.3E-08	8.0E-08	NA	1.0E-01	NA	NA	1E-07	8E-07
Chloroform	6.9E-03	1.6E-02	1	1.1E-09	2.7E-09	5.0E-09	1.2E-08	6.1E-03	1.0E-02	7E-12	2E-11	5E-07	1E-06
Tetrachloroethene	7.6E-03	1.2E-02	1	1.3E-09	2.0E-09	5.5E-09	8.7E-09	5.2E-02	1.0E-02	7E-11	1E-10	5E-07	9E-07
Toluene	4.0E-03	3.0E-03	1	6.6E-10	5.0E-10	2.9E-09	2.2E-09	NA	2.0E-01	NA	NA	1E-08	1E-08
Trichloroethane, 1,1,1-	7.7E-03	4.0E-03	1	1.3E-09	6.7E-10	5.6E-09	2.9E-09	NA	NA	NA	NA	NA	NA
SEMIVOLATILES													
Acenaphthene	3.1E-01	1.4E+01	1	5.1E-08	2.3E-06	2.2E-07	1.0E-05	NA	6.0E-02	NA	NA	4E-06	2E-04
Acenaphthylene	3.8E-01	9.1E-01	1	6.3E-08	1.5E-07	2.8E-07	6.6E-07	NA	NA	NA	NA	NA	NA
Anthracene	4.2E-01	2.2E+01	1	7.0E-08	3.6E-06	3.1E-07	1.6E-05	NA	3.0E-01	NA	NA	1E-06	5E-05
Benzoic acid	4.7E-01	8.7E-01	1	7.8E-08	1.4E-07	3.4E-07	6.3E-07	NA	4.0E+00	NA	NA	9E-08	2E-07
Benzo(a)anthracene	7.8E-01	6.9E+01	1	1.3E-07	1.1E-05	5.7E-07	5.0E-05	7.3E+00	NA	9E-07	8E-05	NA	NA
Benzo(a)pyrene	6.9E-01	4.5E+01	1	1.2E-07	7.5E-06	5.0E-07	3.3E-05	7.3E+00	NA	8E-07	5E-05	NA	NA
Benzo(b/k)fluoranthene	1.3E+00	2.2E+02	1	2.1E-07	3.7E-05	9.3E-07	1.6E-04	7.3E+00	NA	2E-06	3E-04	NA	NA
Benzo(ghi)perylene	4.7E-01	2.9E+01	1	7.8E-08	4.8E-06	3.4E-07	2.1E-05	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.2E-01	2.3E+00	1	7.0E-08	3.8E-07	3.1E-07	1.7E-06	1.4E-02	2.0E-02	1E-09	5E-09	2E-05	8E-05
Butyl benzyl phthalate	3.2E-01	3.3E-01	1	5.4E-08	5.5E-08	2.3E-07	2.4E-07	NA	2.0E-01	NA	NA	1E-06	1E-06
Carbazole	5.3E-01	1.8E+01	1	8.8E-08	3.0E-06	3.9E-07	1.3E-05	NA	NA	NA	NA	NA	NA
Chrysene	7.6E-01	6.3E+01	1	1.3E-07	1.0E-05	5.5E-07	4.6E-05	7.3E+00	NA	9E-07	8E-05	NA	NA
Dibenzofuran	2.1E-01	8.4E+00	1	3.6E-08	1.4E-06	1.6E-07	6.1E-06	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	2.8E-01	6.5E+00	1	4.7E-08	1.1E-06	2.0E-07	4.7E-06	7.3E+00	NA	3E-07	8E-06	NA	NA
Di-n-butyl phthalate	3.6E-01	5.7E+00	1	6.0E-08	9.5E-07	2.6E-07	4.1E-06	NA	1.0E-01	NA	NA	3E-06	4E-05
Fluoranthene	1.2E+00	1.4E+02	1	2.0E-07	2.3E-05	8.5E-07	1.0E-04	NA	4.0E-02	NA	NA	2E-05	3E-03
Fluorene	2.5E-01	1.5E+01	1	4.2E-08	2.5E-06	1.8E-07	1.1E-05	NA	4.0E-02	NA	NA	5E-06	3E-04
Indeno(1,2,3-cd)pyrene	4.6E-01	2.4E+01	1	7.7E-08	3.9E-06	3.4E-07	1.7E-05	7.3E+00	NA	6E-07	3E-05	NA	NA
Methylnaphthalene, 2-	3.7E-01	4.3E+00	1	6.1E-08	7.1E-07	2.7E-07	3.1E-06	NA	NA	NA	NA	NA	NA
Naphthalene	3.2E-01	9.3E+00	1	5.3E-08	1.5E-06	2.3E-07	6.8E-06	NA	4.0E-02	NA	NA	6E-06	2E-04
Phenanthrene	1.0E+00	1.3E+02	1	1.7E-07	2.2E-05	7.4E-07	9.5E-05	NA	NA	NA	NA	NA	NA
Pyrene	9.9E-01	1.2E+02	1	1.6E-07	2.0E-05	7.2E-07	8.7E-05	NA	3.0E-02	NA	NA	2E-05	3E-03
TCDD, 2,3,7,8-	2.1E-04	2.3E-04	1	3.5E-11	3.8E-11	1.5E-10	1.7E-10	1.5E+05	NA	5E-06	6E-06	NA	NA

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATIONAL (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
INCIDENTAL INGESTION OF SOIL (cont)
NCBC DAVISVILLE – SITE 09

Constituent	Soil Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
PESTICIDES/PCBs													
BHC, beta-	6.9E-03	2.1E-02	1	1.2E-09	3.5E-09	5.0E-09	1.5E-08	1.8E+00	3.0E-04	2E-09	6E-09	2E-05	5E-05
Chlordane, alpha	1.4E-02	2.8E-02	0.3	7.1E-10	1.4E-09	3.1E-09	6.1E-09	1.3E+00	6.0E-05	9E-10	2E-09	5E-05	1E-04
Chlordane, gamma-	1.3E-02	2.3E-02	0.3	6.4E-10	1.1E-09	2.8E-09	5.0E-09	1.3E+00	6.0E-05	8E-10	1E-09	5E-05	8E-05
DDD, 4,4'-	1.2E-02	9.5E-02	0.3	6.2E-10	4.7E-09	2.7E-09	2.1E-08	2.4E-01	5.0E-04	1E-10	1E-09	5E-06	4E-05
DDE, 4,4'-	1.0E-02	1.6E-02	0.3	5.0E-10	8.0E-10	2.2E-09	3.5E-09	3.4E-01	5.0E-04	2E-10	3E-10	4E-06	7E-06
DDT, 4,4'-	1.7E-02	6.0E-02	0.3	8.7E-10	3.0E-09	3.8E-09	1.3E-08	3.4E-01	5.0E-04	3E-10	1E-09	8E-06	3E-05
Dieldrin	9.0E-03	5.4E-02	0.3	4.5E-10	2.7E-09	2.0E-09	1.2E-08	1.6E+01	5.0E-05	7E-09	4E-08	4E-05	2E-04
Endosulfan II	7.4E-03	7.4E-03	1	1.2E-09	1.2E-09	5.4E-09	5.4E-09	NA	6.0E-03	NA	NA	9E-07	9E-07
Endosulfan sulfate	1.1E-02	3.3E-02	1	1.8E-09	5.5E-09	7.8E-09	2.4E-08	NA	NA	NA	NA	NA	NA
Endrin	9.3E-03	2.4E-02	0.3	4.6E-10	1.2E-09	2.0E-09	5.2E-09	NA	3.0E-04	NA	NA	7E-06	2E-05
Endrin aldehyde	5.3E-03	1.1E-01	0.3	2.6E-10	5.5E-09	1.2E-09	2.4E-08	NA	NA	NA	NA	NA	NA
Endrin ketone	1.2E-02	5.7E-02	0.3	6.0E-10	2.8E-09	2.6E-09	1.2E-08	NA	NA	NA	NA	NA	NA
Heptachlor	5.6E-03	1.4E-03	0.3	2.8E-10	7.0E-11	1.2E-09	3.1E-10	4.5E+00	5.0E-04	1E-09	3E-10	2E-06	6E-07
Heptachlor epoxide	6.1E-03	2.9E-02	0.3	3.1E-10	1.4E-09	1.3E-09	6.3E-09	9.1E+00	1.3E-05	3E-09	1E-08	1E-04	5E-04
Methoxychlor, p,p'-	5.4E-02	6.3E-01	0.3	2.7E-09	3.1E-08	1.2E-08	1.4E-07	NA	5.0E-03	NA	NA	2E-06	3E-05
Aroclor-1260	2.0E-01	3.0E+01	0.3	1.0E-08	1.5E-06	4.4E-08	6.5E-06	7.7E+00	NA	8E-08	1E-05	NA	NA

(a) Surface soil concentrations

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	1E-05	6E-04	4E-02	1E+00

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x IR x RAF x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Unit Conversion (UC) = 1E-06 kg/mg
Ingestion Rate (IR) = 125 mg/d
Relative Absorption Factor (RAF) = CS Constituent-specific (--)
Exposure Frequency (EF) = 72 d/yr
Exposure Duration (ED) = 16 yr
Body Weight (BW) = 33.9 kg
Averaging Time (AT) = 25550 d (cancer)
5840 d (noncancer)

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
CANCER RISK ESTIMATES USING TEFs FOR CARCINOGENIC PAHs
INCIDENTAL INGESTION OF SOIL
NCBC DAVISVILLE – SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
INORGANICS		
Aluminum	NA	NA
Antimony	NA	NA
Arsenic	8E-07	9E-06
Barium	NA	NA
Beryllium	8E-07	5E-05
Cadmium	NA	NA
Chromium III	NA	NA
Chromium VI	NA	NA
Cobalt	NA	NA
Copper	NA	NA
Lead	NA	NA
Manganese	NA	NA
Mercury	NA	NA
Nickel	NA	NA
Selenium	NA	NA
Silver	NA	NA
Vanadium	NA	NA
Zinc	NA	NA
VOLATILES		
Acetone	NA	NA
Chloroform	7E-12	2E-11
Tetrachloroethene	7E-11	1E-10
Toluene	NA	NA
Trichloroethane, 1,1,1-	NA	NA
SEMIVOLATILES		
Acenaphthene	NA	NA
Acenaphthylene	NA	NA
Anthracene	NA	NA
Benzoic acid	NA	NA
Benzo(a)anthracene ^	1E-07	1E-05
Benzo(a)pyrene ^	8E-07	5E-05
Benzo(b/k)fluoranthene ^	2E-07	4E-05
Benzo(ghi)perylene	NA	NA
Bis(2-ethylhexyl)phthalate	1E-09	5E-09
Butyl benzyl phthalate	NA	NA
Carbazole	NA	NA
Chrysene ^	4E-09	3E-07
Dibenzofuran	NA	NA
Dibenzo(a,h)anthracene ^	4E-07	9E-06
Di-n-butyl phthalate	NA	NA
Fluoranthene	NA	NA
Fluorene	NA	NA
Indeno(1,2,3-cd)pyrene ^	1E-07	7E-06
Methylnaphthalene, 2-	NA	NA
Naphthalene	NA	NA
Phenanthrene	NA	NA
Pyrene	NA	NA
TCDD, 2,3,7,8-	5E-06	6E-06

TABLE D-2 (cont.)
SCENARIO 2 - FUTURE RECREATIONAL (YOUTHS AGED 2 TO 18 YEARS)
CANCER RISK ESTIMATES USING TEFs FOR CARCINOGENIC PAHs
INCIDENTAL INGESTION OF SOIL
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
PESTICIDES/PCBs		
BHC, beta-	2E-09	6E-09
Chlordane, alpha	9E-10	2E-09
Chlordane, gamma-	8E-10	1E-09
DDD, 4,4'-	1E-10	1E-09
DDE, 4,4'-	2E-10	3E-10
DDT, 4,4'-	3E-10	1E-09
Dieldrin	7E-09	4E-08
Endosulfan II	NA	NA
Endosulfan sulfate	NA	NA
Endrin	NA	NA
Endrin aldehyde	NA	NA
Endrin ketone	NA	NA
Heptachlor	1E-09	3E-10
Heptachlor epoxide	3E-09	1E-08
Methoxychlor, p,p'-	NA	NA
Aroclor-1260	8E-08	1E-05

	Mean Cancer Risk	RME Cancer Risk
TOTAL:	9E-06	2E-04

[shaded box] = Cancer risk > 1E-06 or

^ Carcinogenic PAH

TABLE D-2 (cont.)
SCENARIO 2 - FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
DERMAL CONTACT WITH SOIL
NCBC DAVISVILLE - SITE 09

Constituent	Soil Concentrations (a): Geometric Mean Soil Concentration (mg/kg)	Soil Concentrations (a): Maximum Soil Concentration (mg/kg)	Exposure Estimates: Relative Absorption Factor (--)	Exposure Estimates: Mean Dose (Cancer) (mg/kg-d)	Exposure Estimates: RME Dose (Cancer) (mg/kg-d)	Exposure Estimates: Mean Dose (Noncancer) (mg/kg-d)	Exposure Estimates: RME Dose (Noncancer) (mg/kg-d)	Toxicity Values: Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Toxicity Values: Noncancer Reference Dose (Oral) (mg/kg-d)	Risk Estimates: Mean Cancer Risk (--)	Risk Estimates: RME Cancer Risk (--)	Risk Estimates: Mean Hazard Quotient (--)	Risk Estimates: RME Hazard Quotient (--)
INORGANICS													
Aluminum	5.7E+03	3.8E+04	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Antimony	1.2E+01	6.5E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-04	NA	NA	NA	NA
Arsenic	2.6E+00	3.3E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00	3.0E-04	NA	NA	NA	NA
Barium	3.6E+01	1.2E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	7.0E-02	NA	NA	NA	NA
Beryllium	1.1E+00	7.5E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.3E+00	5.0E-03	NA	NA	NA	NA
Cadmium	1.7E+00	1.7E+02	0.01	8.1E-09	8.1E-07	3.5E-08	3.6E-06	NA	1.0E-03	NA	NA	4E-05	4E-03
Chromium III	1.9E+01	8.4E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E+00	NA	NA	NA	NA
Chromium VI	2.6E+00	1.2E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Cobalt	9.4E+00	4.3E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Copper	9.6E+01	2.5E+04	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.7E-02	NA	NA	NA	NA
Lead	1.1E+02	8.7E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Manganese	1.9E+02	2.9E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.4E-01	NA	NA	NA	NA
Mercury	2.1E-01	2.8E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-04	NA	NA	NA	NA
Nickel	2.9E+01	4.2E+03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-02	NA	NA	NA	NA
Selenium	9.4E-01	3.2E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Silver	7.5E-01	3.3E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Vanadium	1.8E+01	1.3E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	7.0E-03	NA	NA	NA	NA
Zinc	2.8E+02	3.4E+04	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-01	NA	NA	NA	NA
VOLATILES													
Acetone	1.7E-02	1.1E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E-01	NA	NA	NA	NA
Chloroform	6.9E-03	1.6E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-03	1.0E-02	NA	NA	NA	NA
Tetrachloroethene	7.6E-03	1.2E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.2E-02	1.0E-02	NA	NA	NA	NA
Toluene	4.0E-03	3.0E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-01	NA	NA	NA	NA
Trichloroethane, 1,1,1-	7.7E-03	4.0E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
SEMIVOLATILES													
Acenaphthene	3.1E-01	1.4E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	6.0E-02	NA	NA	NA	NA
Acenaphthylene	3.8E-01	9.1E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Anthracene	4.2E-01	2.2E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-01	NA	NA	NA	NA
Benzoic acid	4.7E-01	8.7E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E+00	NA	NA	NA	NA
Benzo(a)anthracene	7.8E-01	6.9E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Benzo(a)pyrene	6.9E-01	4.5E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Benzo(b/k)fluoranthene	1.3E+00	2.2E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Benzo(ghi)perylene	4.7E-01	2.9E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	4.2E-01	2.3E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-02	2.0E-02	NA	NA	NA	NA
Butyl benzyl phthalate	3.2E-01	3.3E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-01	NA	NA	NA	NA
Carbazole	5.3E-01	1.8E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Chrysene	7.6E-01	6.3E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Dibenzofuran	2.1E-01	8.4E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	2.8E-01	6.5E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Di-n-butyl phthalate	3.6E-01	5.7E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E-01	NA	NA	NA	NA
Fluoranthene	1.2E+00	1.4E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-02	NA	NA	NA	NA
Fluorene	2.5E-01	1.5E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-02	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	4.6E-01	2.4E+01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E+00	NA	NA	NA	NA	NA
Methylnaphthalene, 2-	3.7E-01	4.3E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Naphthalene	3.2E-01	9.3E+00	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-02	NA	NA	NA	NA
Phenanthrene	1.0E+00	1.3E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Pyrene	9.9E-01	1.2E+02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-02	NA	NA	NA	NA
TCDD, 2,3,7,8-	2.1E-04	2.3E-04	0.04	4.0E-12	4.3E-12	1.8E-11	1.9E-11	1.5E+05	NA	6E-07	6E-07	NA	NA

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATIONAL (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
DERMAL CONTACT WITH SOIL (cont)
NCBC DAVISVILLE – SITE 09

	Soil Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Soil Concentration (mg/kg)	Maximum Soil Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
PESTICIDES/PCBs													
BHC, beta-	6.9E-03	2.1E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E+00	3.0E-04	NA	NA	NA	NA
Chlordane, alpha	1.4E-02	2.8E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+00	6.0E-05	NA	NA	NA	NA
Chlordane, gamma-	1.3E-02	2.3E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E+00	6.0E-05	NA	NA	NA	NA
DDD, 4,4'-	1.2E-02	9.5E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01	5.0E-04	NA	NA	NA	NA
DDE, 4,4'-	1.0E-02	1.6E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01	5.0E-04	NA	NA	NA	NA
DDT, 4,4'-	1.7E-02	6.0E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01	5.0E-04	NA	NA	NA	NA
Dieldrin	9.0E-03	5.4E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E+01	5.0E-05	NA	NA	NA	NA
Endosulfan II	7.4E-03	7.4E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	6.0E-03	NA	NA	NA	NA
Endosulfan sulfate	1.1E-02	3.3E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Endrin	9.3E-03	2.4E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-04	NA	NA	NA	NA
Endrin aldehyde	5.3E-03	1.1E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Endrin ketone	1.2E-02	5.7E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Heptachlor	5.6E-03	1.4E-03	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.5E+00	5.0E-04	NA	NA	NA	NA
Heptachlor epoxide	6.1E-03	2.9E-02	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.1E+00	1.3E-05	NA	NA	NA	NA
Methoxychlor, p,p'-	5.4E-02	6.3E-01	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Aroclor-1260	2.0E-01	3.0E+01	0.06	5.7E-09	8.5E-07	2.5E-08	3.7E-06	7.7E+00	NA	4E-08	7E-06	NA	NA

(a) Surface soil concentrations

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	6E-07	7E-06	4E-05	4E-03

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x CR x RAF x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Unit Conversion (UC) =	1E-06 kg/mg
Dermal Contact Rate (CR) =	355 mg/d
Relative Absorption Factor (RAF) =	CS Constituent-specific (--)
Exposure Frequency (EF) =	72 d/yr
Exposure Duration (ED) =	16 yr
Body Weight (BW) =	33.9 kg
Averaging Time (AT) =	25550 d (cancer)
	5840 d (noncancer)

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
DERMAL CONTACT WITH GROUND WATER WHILE SHOWERING
NCBC DAVISVILLE – SITE 09

	Ground Water Concentrations		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Ground Water Concentration (mg/l)	Maximum Ground Water Concentration (mg/l)	Adjusted Dermal Permeability Constant (cm/hr)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Aluminum	3.6E-01	3.8E+01	1.0E-03	2.6E-07	2.7E-05	1.1E-06	1.2E-04	NA	NA	NA	NA	NA	NA
Antimony	3.3E-02	7.1E-02	1.0E-03	2.3E-08	5.0E-08	1.0E-07	2.2E-07	NA	4.0E-04	NA	NA	3E-04	6E-04
Arsenic	4.3E-03	1.5E-02	1.0E-03	3.0E-09	1.1E-08	1.3E-08	4.6E-08	1.8E+00	3.0E-04	5E-09	2E-08	4E-05	2E-04
Barium	5.1E-02	7.5E-01	1.0E-03	3.6E-08	5.3E-07	1.6E-07	2.3E-06	NA	7.0E-02	NA	NA	2E-06	3E-05
Beryllium	1.1E-03	2.7E-03	1.0E-03	7.6E-10	1.9E-09	3.3E-09	8.4E-09	4.3E+00	5.0E-03	3E-09	8E-09	7E-07	2E-06
Cadmium	3.4E-04	5.2E-03	1.0E-03	2.4E-10	3.7E-09	1.1E-09	1.6E-08	NA	1.0E-03	NA	NA	1E-06	2E-05
Chromium III	7.0E-03	2.3E-02	1.0E-03	5.0E-09	1.6E-08	2.2E-08	7.1E-08	NA	1.0E+00	NA	NA	2E-08	7E-08
Chromium VI	1.0E-03	3.3E-03	1.0E-03	7.1E-10	2.3E-09	3.1E-09	1.0E-08	NA	5.0E-03	NA	NA	6E-07	2E-06
Cobalt	1.0E-02	5.0E-02	4.0E-04	3.0E-09	1.4E-08	1.3E-08	6.2E-08	NA	NA	NA	NA	NA	NA
Copper	7.5E-03	7.2E-02	1.0E-03	5.3E-09	5.1E-08	2.3E-08	2.2E-07	NA	3.7E-02	NA	NA	6E-07	6E-06
Lead	3.4E-03	2.6E-02	4.0E-06	9.7E-12	7.2E-11	4.2E-11	3.2E-10	NA	NA	NA	NA	NA	NA
Manganese	4.2E-01	1.9E+00	1.0E-03	3.0E-07	1.4E-06	1.3E-06	5.9E-06	NA	1.4E-01	NA	NA	9E-06	4E-05
Mercury	2.1E-04	3.2E-04	3.0E-03	4.5E-10	6.8E-10	2.0E-09	3.0E-09	NA	3.0E-04	NA	NA	7E-06	1E-05
Silver	4.2E-04	7.1E-04	6.0E-04	1.8E-10	3.0E-10	7.8E-10	1.3E-09	NA	5.0E-03	NA	NA	2E-07	3E-07
Thallium	2.7E-03	3.9E-03	1.0E-03	1.9E-09	2.8E-09	8.4E-09	1.2E-08	NA	8.0E-05	NA	NA	1E-04	2E-04
Vanadium	7.3E-03	2.3E-02	1.0E-03	5.2E-09	1.6E-08	2.3E-08	7.1E-08	NA	7.0E-03	NA	NA	3E-06	1E-05
Zinc	2.7E-02	1.7E-01	6.0E-04	1.1E-08	7.0E-08	5.0E-08	3.1E-07	NA	3.0E-01	NA	NA	2E-07	1E-06
VOLATILES													
Acetone	1.4E-02	3.0E+00	5.7E-04	5.6E-09	1.2E-06	2.5E-08	5.3E-06	NA	1.0E-01	NA	NA	2E-07	5E-05
Benzene	7.7E-03	1.1E-02	2.1E-02	1.1E-07	1.6E-07	5.0E-07	6.8E-07	2.9E-02	NA	3E-09	5E-09	NA	NA
Chlorobenzene	1.2E-02	6.2E-01	4.1E-02	3.5E-07	1.8E-05	1.5E-06	7.9E-05	NA	2.0E-02	NA	NA	8E-05	4E-03
Dichloroethane, 1,2-	9.6E-03	3.2E-01	5.3E-03	3.6E-08	1.2E-06	1.6E-07	5.3E-06	9.1E-02	NA	3E-09	1E-07	NA	NA
Dichloroethene, 1,2- (Total)	1.4E-02	2.8E+01	1.0E-02	9.6E-08	2.0E-04	4.2E-07	8.7E-04	NA	9.0E-03	NA	NA	5E-05	1E-01
Dichloropropane, 1,2-	1.1E-02	9.4E-01	1.0E-02	7.7E-08	6.7E-06	3.4E-07	2.9E-05	6.8E-02	NA	5E-09	5E-07	NA	NA
Ethylbenzene	1.3E-02	8.7E-02	7.4E-02	6.9E-07	4.6E-06	3.0E-06	2.0E-05	NA	1.0E-01	NA	NA	3E-05	2E-04
Toluene	1.0E-02	2.8E-02	4.5E-02	3.3E-07	8.9E-07	1.5E-06	3.9E-06	NA	2.0E-01	NA	NA	7E-06	2E-05
Trichloroethene	1.0E-02	1.2E+00	1.6E-02	1.1E-07	1.4E-05	5.0E-07	6.0E-05	1.1E-02	NA	1E-09	1E-07	NA	NA
Vinyl chloride	1.4E-02	7.0E+00	7.3E-03	7.2E-08	3.6E-05	3.1E-07	1.6E-04	1.9E+00	NA	1E-07	7E-05	NA	NA
Xylenes (Total)	1.4E-02	1.9E-01	8.0E-02	7.9E-07	1.1E-05	3.5E-06	4.7E-05	NA	2.0E+00	NA	NA	2E-06	2E-05
SEMIVOLATILES													
Acenaphthene	1.2E-02	6.6E-02	1.3E-01	1.1E-06	6.2E-06	4.9E-06	2.7E-05	NA	6.0E-02	NA	NA	8E-05	5E-04
Bis(2-chloroethyl)ether	8.2E-03	1.4E-02	2.1E-03	1.2E-08	2.1E-08	5.4E-08	9.1E-08	1.1E+00	NA	1E-08	2E-08	NA	NA
Bis(2-chloroisopropyl)ether	5.6E-03	3.0E-03	1.2E-02	4.6E-08	2.5E-08	2.0E-07	1.1E-07	7.0E-02	NA	3E-09	2E-09	NA	NA
Dibenzofuran	1.1E-02	2.4E-02	1.5E-01	1.2E-06	2.5E-06	5.2E-06	1.1E-05	NA	NA	NA	NA	NA	NA
Dichlorobenzene, 1,2-	1.1E-02	8.0E-03	6.1E-02	4.6E-07	3.5E-07	2.0E-06	1.5E-06	NA	9.0E-02	NA	NA	2E-05	2E-05
Dichlorobenzene, 1,4-	1.3E-02	4.2E-01	6.2E-02	5.8E-07	1.8E-05	2.5E-06	8.1E-05	2.4E-02	NA	1E-08	4E-07	NA	NA
Diethyl phthalate	5.6E-03	2.0E-03	4.8E-03	1.9E-08	6.8E-09	8.4E-08	3.0E-08	NA	8.0E-01	NA	NA	1E-07	4E-08
Dimethylphenol, 2,4-	1.2E-02	8.6E-01	1.5E-02	1.3E-07	9.2E-06	5.8E-07	4.0E-05	NA	2.0E-02	NA	NA	3E-05	2E-03
Fluorene	1.2E-02	2.3E-02	1.7E-01	1.4E-06	2.8E-06	6.1E-06	1.2E-05	NA	4.0E-02	NA	NA	2E-04	3E-04
Methylnaphthalene, 2-	1.1E-02	2.5E-02	3.7E-05	3.0E-10	6.5E-10	1.3E-09	2.8E-09	NA	NA	NA	NA	NA	NA
Methylphenol, 2-	1.2E-02	3.5E-01	1.0E-02	8.9E-08	2.5E-06	3.9E-07	1.1E-05	NA	5.0E-02	NA	NA	8E-06	2E-04
Methylphenol, 4-	1.3E-02	3.7E-01	1.0E-02	9.3E-08	2.7E-06	4.0E-07	1.2E-05	NA	5.0E-03	NA	NA	8E-05	2E-03
Naphthalene	1.1E-02	4.7E-02	6.9E-02	5.3E-07	2.3E-06	2.3E-06	1.0E-05	NA	4.0E-02	NA	NA	6E-05	3E-04
Nitrophenol, 4-	1.6E-02	3.0E-03	6.1E-03	6.9E-08	1.3E-08	3.0E-07	5.7E-08	NA	NA	NA	NA	NA	NA
Phenol	1.1E-02	6.6E-02	5.5E-03	4.3E-08	2.6E-07	1.9E-07	1.1E-06	NA	6.0E-01	NA	NA	3E-07	2E-06

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATIONAL (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
DERMAL CONTACT WITH GROUND WATER WHILE SHOWERING
NCBC DAVISVILLE – SITE 09

Constituent	Ground Water Concentrations		Exposure Estimates					Toxicity Values		Risk Estimates			
	Geometric Mean Ground Water Concentration (mg/l)	Maximum Ground Water Concentration (mg/l)	Adjusted Dermal Permability Constant (cm/hr)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
PESTICIDES/PCBs													
Dieldrin	4.0E-05	2.4E-06	1.6E-02	4.5E-10	2.7E-11	2.0E-09	1.2E-10	1.6E+01	5.0E-05	7E-09	4E-10	4E-05	2E-06

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	2E-07	7E-05	1E-03	1E-01

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x SA x Kp_{adj} x ET x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Constituent Concentration in Ground Water (CW) = CS mg/l
Unit Conversion (UC) = 1E-03 l/cm3
Skin surface area available for contact (SA) = 12000 cm2
Dermal Permability Constant (Kp_{adj}) = CS (cm/hr)
Exposure Time (ET) = 0.16 hr/d
Exposure Frequency (EF) = 20 d/yr
Exposure Duration (ED) = 16 yr
Body Weight (BW) = 33.9 kg
Averaging Time (AT) = 25550 d (cancer)
5840 d (noncancer)

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
INHALATION OF VOLATILIZED CONSTITUENTS IN GROUND WATER WHILE SHOWERING
NCBC DAVISVILLE – SITE 09

Constituent	Air Concentrations (a)		Exposure Estimates				Toxicity Values		Risk Estimates			
	Geometric Mean Air Concentration (mg/m3)	Maximum Air Concentration (mg/m3)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Inhalation) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Inhalation) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS												
Aluminum	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	4.0E-04	NA	NA	NA	NA
Arsenic	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.0E+01	3.0E-04	NA	NA	NA	NA
Barium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E-04	NA	NA	NA	NA
Beryllium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.4E+00	5.0E-03	NA	NA	NA	NA
Cadmium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E+00	5.0E-04	NA	NA	NA	NA
Chromium III	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.0E+00	NA	NA	NA	NA
Chromium III	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.1E+01	5.0E-03	NA	NA	NA	NA
Cobalt	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Copper	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Lead	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	1.1E-04	NA	NA	NA	NA
Mercury	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.6E-05	NA	NA	NA	NA
Silver	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Thallium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.0E-05	NA	NA	NA	NA
Vanadium	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	7.0E-03	NA	NA	NA	NA
Zinc	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	3.0E-01	NA	NA	NA	NA
VOLATILES												
Acetone	5.4E-05	1.2E-02	7.9E-09	1.7E-06	3.5E-08	7.5E-06	NA	1.0E-01	NA	NA	3E-07	7E-05
Benzene	5.2E-03	7.0E-03	7.6E-07	1.0E-06	3.3E-06	4.6E-06	2.9E-02	NA	2E-08	3E-08	NA	NA
Chlorobenzene	8.2E-03	4.2E-01	1.2E-06	6.3E-05	5.3E-06	2.7E-04	NA	5.0E-03	NA	NA	1E-03	5E-02
Dichloroethane, 1,2-	1.7E-03	5.8E-02	2.6E-07	8.5E-06	1.1E-06	3.7E-05	9.1E-02	NA	2E-08	8E-07	NA	NA
Dichloroethene, 1,2- (Total)	1.4E-02	2.8E+01	2.0E-06	4.1E-03	8.7E-06	1.8E-02	NA	9.0E-03	NA	NA	1E-03	2E+00
Dichloropropane, 1,2-	5.1E-03	4.4E-01	7.5E-07	6.5E-05	3.3E-06	2.8E-04	6.8E-02	1.1E-03	5E-08	4E-06	3E-03	2E-01
Ethylbenzene	1.7E-02	1.1E-01	2.6E-06	1.7E-05	1.1E-05	7.4E-05	NA	2.9E-01	NA	NA	4E-05	3E-04
Toluene	8.8E-03	2.4E-02	1.3E-06	3.5E-06	5.7E-06	1.5E-05	NA	1.1E-01	NA	NA	5E-05	1E-04
Trichloroethene	2.4E-02	2.9E+00	3.5E-06	4.2E-04	1.5E-05	1.8E-03	6.0E-03	NA	2E-08	3E-06	NA	NA
Vinyl chloride	3.7E-02	1.9E+01	5.5E-06	2.8E-03	2.4E-05	1.2E-02	3.0E-01	NA	2E-06	8E-04	NA	NA
Xylenes (Total)	1.5E-02	2.1E-01	2.3E-06	3.1E-05	1.0E-05	1.4E-04	NA	2.0E+00	NA	NA	5E-06	7E-05
SEMIVOLATILES												
Acenaphthene	6.9E-04	3.8E-03	1.0E-07	5.6E-07	4.4E-07	2.5E-06	NA	6.0E-02	NA	NA	7E-06	4E-05
Bis(2-chloroethyl)ether	2.4E-05	4.0E-05	3.5E-09	6.0E-09	1.5E-08	2.6E-08	1.1E+00	NA	4E-09	7E-09	NA	NA
Bis(2-chloroisopropyl)ether	1.6E-04	8.7E-05	2.4E-08	1.3E-08	1.1E-07	5.6E-08	3.5E-02	NA	8E-10	5E-10	NA	NA
Dibenzofuran	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Dichlorobenzene, 1,2-	5.8E-03	4.4E-03	8.6E-07	6.5E-07	3.8E-06	2.8E-06	NA	9.0E-02	NA	NA	4E-05	3E-05
Dichlorobenzene, 1,4-	1.3E-02	4.3E-01	2.0E-06	6.4E-05	8.7E-06	2.8E-04	NA	2.2E-01	NA	NA	4E-05	1E-03
Diethyl phthalate	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	8.0E-01	NA	NA	NA	NA
Dimethylphenol, 2,4-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	2.0E-02	NA	NA	NA	NA
Fluorene	3.5E-04	6.9E-04	5.1E-08	1.0E-07	2.3E-07	4.5E-07	NA	4.0E-02	NA	NA	6E-06	1E-05
Methylnaphthalene, 2-	1.2E-03	2.7E-03	1.8E-07	4.1E-07	8.1E-07	1.8E-06	NA	NA	NA	NA	NA	NA
Methylphenol, 2-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-02	NA	NA	NA	NA
Methylphenol, 4-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	5.0E-03	NA	NA	NA	NA
Naphthalene	1.0E-03	4.5E-03	1.5E-07	6.7E-07	6.6E-07	2.9E-06	NA	4.0E-02	NA	NA	2E-05	7E-05
Nitrophenol, 4-	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	NA	6.0E-01	NA	NA	NA	NA

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATIONAL (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
INHALATION OF VOLATILIZED CONSTITUENTS IN GROUND WATER WHILE SHOWERING
NCBC DAVISVILLE – SITE 09

	Air Concentrations (a)		Exposure Estimates				Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Air Concentration (mg/m3)	Maximum Air Concentration (mg/m3)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Inhalation) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Inhalation) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
PESTICIDES/PCBs												
Dieldrin	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E+01	5.0E-05	NA	NA	NA	NA

(a) Based on measured soil gas concentrations

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	2E-06	8E-04	5E-03	2E+00

[shaded] = Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x IR x RAF x ET x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Constituent Concentration in Air (CA) =	CS mg/m3
Inhalation Rate (IR) =	2.5 m3/hr
Relative Absorption Factor (RAF) =	1 for all constituents (--)
Exposure Time (ET) =	0.16 hr/d
Exposure Frequency (EF) =	20 d/yr
Exposure Duration (ED) =	16 yr
Body Weight (BW) =	33.9 kg
Averaging Time (AT) =	25550 d (cancer)
	5840 d (noncancer)

TABLE D-2 (cont.)
SCENARIO 2 - FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
ESTIMATE OF CONSTITUENT CONCENTRATIONS IN AIR WHILE SHOWERING
NCBC DAVISVILLE - SITE 09

	Ground Water Concentrations		Exposure Estimates			EPC (a)	
Constituent	Geometric Mean Ground Water Concentration (mg/l)	Maximum Ground Water Concentration (mg/l)	Henry's Law Constant (atm*m3/mol)	Henry's Law Constant (--)	Molecular Weight (g/mol)	Geometric Mean Air Concentration (mg/m3)	Maximum Air Concentration (mg/m3)
INORGANICS							
Aluminum	3.6E-01	3.8E+01	NA	0.0E+00	26.89	NA	NA
Antimony	3.3E-02	7.1E-02	NA	0.0E+00	12.75	NA	NA
Arsenic	4.3E-03	1.5E-02	NA	0.0E+00	74.92	NA	NA
Barium	5.1E-02	7.5E-01	NA	0.0E+00	137.33	NA	NA
Beryllium	1.1E-03	2.7E-03	NA	0.0E+00	9.01218	NA	NA
Cadmium	3.4E-04	5.2E-03	NA	0.0E+00	112.41	NA	NA
Chromium III	7.0E-03	2.3E-02	NA	0.0E+00	51.996	NA	NA
Chromium III	1.0E-03	3.3E-03	NA	0.0E+00	51.996	NA	NA
Cobalt	1.0E-02	5.0E-02	NA	0.0E+00	58.9332	NA	NA
Copper	7.5E-03	7.2E-02	NA	0.0E+00	63.546	NA	NA
Lead	3.4E-03	2.6E-02	NA	0.0E+00	207.2	NA	NA
Manganese	4.2E-01	1.9E+00	NA	0.0E+00	54.94	NA	NA
Mercury	2.1E-04	3.2E-04	1.1E-02	4.5E-01	200.59	NA	NA
Silver	4.2E-04	7.1E-04	NA	0.0E+00	107.8682	NA	NA
Thallium	2.7E-03	3.9E-03	NA	0.0E+00	204.38	NA	NA
Vanadium	7.3E-03	2.3E-02	NA	0.0E+00	50.94	NA	NA
Zinc	2.7E-02	1.7E-01	NA	0.0E+00	65.38	NA	NA
VOLATILES							
Acetone	1.4E-02	3.0E+00	4.3E-05	1.7E-03	58.08	5.4E-05	1.2E-02
Benzene	7.7E-03	1.1E-02	5.6E-03	2.2E-01	78.11	5.2E-03	7.0E-03
Chlorobenzene	1.2E-02	6.2E-01	3.9E-03	1.5E-01	112.56	8.2E-03	4.2E-01
Dichloroethane, 1,2-	9.6E-03	3.2E-01	1.2E-03	4.6E-02	98.96	1.7E-03	5.8E-02
Dichloroethene, 1,2- (Total)	1.4E-02	2.8E+01	6.7E-03	2.6E-01	96.94	1.4E-02	2.8E+01
Dichloropropane, 1,2-	1.1E-02	9.4E-01	2.7E-03	1.1E-01	112.99	5.1E-03	4.4E-01
Ethylbenzene	1.3E-02	8.7E-02	8.0E-03	3.2E-01	106.17	1.7E-02	1.1E-01
Toluene	1.0E-02	2.8E-02	5.9E-03	2.3E-01	92.14	8.8E-03	2.4E-02
Trichloroethene	1.0E-02	1.2E+00	1.2E-02	4.6E-01	131.39	2.4E-02	2.9E+00
Vinyl chloride	1.4E-02	7.0E+00	2.8E-02	1.1E+00	62.5	3.7E-02	1.9E+01
Xylenes (Total)	1.4E-02	1.9E-01	6.7E-03	2.6E-01	106.17	1.5E-02	2.1E-01
SEMIVOLATILES							
Acenaphthene	1.2E-02	6.6E-02	2.4E-04	9.5E-03	154.21	6.9E-04	3.8E-03
Bis(2-chloroethyl)ether	8.2E-03	1.4E-02	1.3E-05	5.1E-04	143.01	2.4E-05	4.0E-05
Bis(2-chloroisopropyl)ether	5.6E-03	3.0E-03	1.1E-04	4.3E-03	171.07	1.6E-04	8.7E-05
Dibenzofuran	1.1E-02	2.4E-02	NA	0.0E+00	168.19	NA	NA
Dichlorobenzene, 1,2-	1.1E-02	8.0E-03	2.4E-03	9.4E-02	147	5.8E-03	4.4E-03
Dichlorobenzene; 1,4-	1.3E-02	4.2E-01	4.5E-03	1.8E-01	147	1.3E-02	4.3E-01
Diethyl phthalate	5.6E-03	2.0E-03	8.5E-07	3.3E-05	222.24	NA	NA
Dimethylphenol, 2,4-	1.2E-02	8.6E-01	6.6E-06	2.6E-04	122.17	NA	NA
Fluorene	1.2E-02	2.3E-02	1.2E-04	4.6E-03	166.22	3.5E-04	6.9E-04
Methylnaphthalene, 2-	1.1E-02	2.5E-02	5.0E-04	2.0E-02	142.2	1.2E-03	2.7E-03
Methylphenol, 2-	1.2E-02	3.5E-01	8.4E-07	3.3E-05	108.14	NA	NA
Methylphenol, 4-	1.3E-02	3.7E-01	3.9E-07	1.5E-05	108.14	NA	NA
Naphthalene	1.1E-02	4.7E-02	4.8E-04	1.9E-02	128.17	1.0E-03	4.5E-03
Nitrophenol, 4-	1.6E-02	3.0E-03	3.5E-06	1.4E-04	139.11	NA	NA
Phenol	1.1E-02	6.6E-02	1.3E-06	5.1E-05	94.11	NA	NA

TABLE D-2 (cont.)
SCENARIO 2 – FUTURE RECREATIONAL (YOUTHS AGED 2 TO 18 YEARS)
ESTIMATE OF CONSTITUENT CONCENTRATIONS IN AIR WHILE SHOWERING
NCBC DAVISVILLE – SITE 09

	Ground Water Concentrations		Exposure Estimates			EPC (a)	
Constituent	Geometric Mean Ground Water Concentration (mg/l)	Maximum Ground Water Concentration (mg/l)	Henry's Law Constant (atm*m3/mol)	Henry's Law Constant (--)	Molecular Weight (g/mol)	Geometric Mean Air Concentration (mg/m3)	Maximum Air Concentration (mg/m3)
PESTICIDES/PCBs							
Dieldrin	4.0E-05	2.4E-06	5.9E-05	2.3E-03	380.91	NA	NA

(a) Exposure point concentration (EPC); estimated only for constitutents with H > 1E-05 atm*m3/mol and MW > 200 g/mol.
NA = Not available

Where:

Air Concentration = [Ground Water Concentration x H' x MW x P x UC1] / [R x T x UC2]

Dimensionless Henry's Law Constant (H') =	CS (--)
Molecular Weight (MW) =	CS (g/mol)
Atmospheric Pressure (P) =	1 atm
Unit Conversion (UC1) =	1000 mg/g
Ideal Gas Constant (R) =	8.2E-05 atm*m3/mol
Temperature while showering (T) =	310 K
Unit Conversion (UC2) =	1E+06 ul/l

TABLE D-2 (cont.)
SCENARIO 2 - FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
INGESTION OF SURFACE WATER WHILE SWIMMING
NCBC DAVISVILLE - SITE 09

	Surface Water Concentrations		Exposure Estimates				Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Surface Water Concentration (mg/l)	Maximum Surface Water Concentration (mg/l)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS												
Aluminum	3.7E-01	3.4E-01	3.5E-06	3.1E-06	1.5E-05	1.4E-05	NA	NA	NA	NA	NA	NA
Arsenic	3.3E-03	4.2E-03	3.0E-08	3.9E-08	1.3E-07	1.7E-07	1.8E+00	3.0E-04	5E-08	7E-08	4E-04	6E-04
Chromium III	7.7E-03	1.0E-02	7.1E-08	9.4E-08	3.1E-07	4.1E-07	NA	1.0E+00	NA	NA	3E-07	4E-07
Chromium VI	1.1E-03	1.5E-03	1.0E-08	1.3E-08	4.4E-08	5.9E-08	NA	5.0E-03	NA	NA	9E-06	1E-05
Manganese	7.2E-02	1.4E-01	6.7E-07	1.3E-06	2.9E-06	5.5E-06	NA	5.0E-03	NA	NA	6E-04	1E-03
Vanadium	7.2E-03	1.2E-02	6.6E-08	1.1E-07	2.9E-07	4.9E-07	NA	7.0E-03	NA	NA	4E-05	7E-05
VOLATILES												
Carbon disulfide	4.0E-03	2.0E-03	3.7E-08	1.8E-08	1.6E-07	8.1E-08	NA	1.0E-01	NA	NA	2E-06	8E-07
Dichloroethene, 1,2- (Total)	5.2E-03	6.0E-03	4.8E-08	5.5E-08	2.1E-07	2.4E-07	NA	9.0E-03	NA	NA	2E-05	3E-05
Tetrachloroethane, 1,1,2,2-	4.4E-03	3.0E-03	4.1E-08	2.8E-08	1.8E-07	1.2E-07	2.0E-01	NA	8E-09	6E-09	NA	NA
Trichloroethene	4.0E-03	2.0E-03	3.7E-08	1.8E-08	1.6E-07	8.1E-08	1.1E-02	NA	4E-10	2E-10	NA	NA

Where:

Dose = [Concentration x UC x IR x RAF x ET x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	6E-08	7E-08	1E-03	2E-03

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Constituent Concentration in Water (Conc) =	CS mg/l
Unit Conversion (UC) =	1E-03 l/ml
Ingestion Rate (IR) =	50 ml/hr
Relative Absorption Factor (RAF) =	1 for all constituents (--)
Exposure Time (ET) =	0.5 hr/d
Exposure Frequency (EF) =	20 d/yr
Exposure Duration (ED) =	16 yr
Age-Adjusted Body Weight (BW) =	33.9 kg (adult)
Averaging Time (AT) =	25550 d (cancer)
	5840 d (noncancer)

TABLE D-2 (cont.)
SCENARIO 2 - FUTURE RECREATION (YOUTHS AGED 2 TO 18 YEARS)
EXPOSURE AND RISK ESTIMATES
DERMAL CONTACT WITH SURFACE WATER WHILE SWIMMING
NCBC DAVISVILLE - SITE 09

	Surface Water Concentrations		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Surface Water Concentration (mg/l)	Maximum Surface Water Concentration (mg/l)	Dermal Permability Constant (cm/hr)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Aluminum	3.7E-01	3.4E-01	1.0E-03	8.3E-07	7.5E-07	3.6E-06	3.3E-06	NA	NA	NA	NA	NA	NA
Arsenic	3.3E-03	4.2E-03	1.0E-03	7.2E-09	9.3E-09	3.2E-08	4.1E-08	1.8E+00	3.0E-04	1E-08	2E-08	1E-04	1E-04
Chromium III	7.7E-03	1.0E-02	1.0E-03	1.7E-08	2.2E-08	7.4E-08	9.8E-08	NA	1.0E+00	NA	NA	7E-08	1E-07
Chromium VI	1.1E-03	1.5E-03	1.0E-03	2.4E-09	3.2E-09	1.1E-08	1.4E-08	NA	5.0E-03	NA	NA	2E-06	3E-06
Manganese	7.2E-02	1.4E-01	1.0E-03	1.6E-07	3.0E-07	7.0E-07	1.3E-06	NA	1.4E-01	NA	NA	5E-06	9E-06
Vanadium	7.2E-03	1.2E-02	1.0E-03	1.6E-08	2.7E-08	6.9E-08	1.2E-07	NA	7.0E-03	NA	NA	1E-05	2E-05
VOLATILES													
Carbon disulfide	4.0E-03	2.0E-03	2.4E-02	2.1E-07	1.1E-07	9.3E-07	4.7E-07	NA	1.0E-01	NA	NA	9E-06	5E-06
Dichloroethene, 1,2- (Total)	5.2E-03	6.0E-03	1.0E-02	1.2E-07	1.3E-07	5.1E-07	5.8E-07	NA	9.0E-03	NA	NA	6E-05	6E-05
Tetrachloroethane, 1,1,2,2-	4.4E-03	3.0E-03	9.0E-03	8.8E-08	6.0E-08	3.8E-07	2.6E-07	2.0E-01	NA	2E-08	1E-08	NA	NA
Trichloroethene	4.0E-03	2.0E-03	1.6E-02	1.4E-07	7.1E-08	6.2E-07	3.1E-07	1.1E-02	NA	2E-09	8E-10	NA	NA

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	3E-08	3E-08	2E-04	2E-04

[shaded box] = Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x SA x Kp_{adj} x ET x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Constituent Concentration in Surface Water (Conc) =	CS mg/l
Unit Conversion (UC) =	1E-03 l/ml
Skin Surface Area Available of Contact (SA) =	12000 cm2
Dermal Permability (Kp_{adj}) =	CS cm/hr
Exposure Time (ET) =	0.5 hr/d
Exposure Frequency (EF) =	20 d/yr
Exposure Duration (ED) =	16 yr
Body Weight (BW) =	33.9 kg
Averaging Time (AT) =	25550 d (cancer) 5840 d (noncancer)

TABLE D-3
SCENARIO 3 – FUTURE SHELLFISHING (OFF-SITE ADULTS)
EXPOSURE AND RISK ESTIMATES
INGESTION OF SHELLFISH (CLAMS)
NCBC DAVISVILLE – SITE 09

Constituent	Tissue Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
	Geometric Mean Clam Concentration (mg/kg)	Maximum Clam Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Chronic Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Arsenic	4.8E-01	8.6E-01	1	3.4E-06	6.1E-06	7.9E-06	1.4E-05	1.8E+00	3.0E-04	6E-06	1E-05	3E-02	5E-02
Cadmium	7.3E-02	1.4E-01	1	5.1E-07	9.7E-07	1.2E-06	2.3E-06	NA	1.0E-03	NA	NA	1E-03	2E-03
Chromium III	6.5E-02	5.6E-01	1	4.6E-07	4.0E-06	1.1E-06	9.3E-06	NA	1.0E+00	NA	NA	1E-06	9E-06
Chromium VI	9.2E-03	8.1E-02	1	6.5E-08	5.7E-07	1.5E-07	1.3E-06	NA	5.0E-03	NA	NA	3E-05	3E-04
Copper	2.1E+00	6.0E+00	1	1.5E-05	4.2E-05	3.5E-05	9.8E-05	NA	3.7E-02	NA	NA	9E-04	3E-03
Lead	1.9E-01	4.3E+00	0.3	4.1E-07	9.1E-06	9.5E-07	2.1E-05	NA	NA	NA	NA	NA	NA
Manganese	3.5E+00	1.2E+01	1	2.5E-05	8.6E-05	5.8E-05	2.0E-04	NA	1.4E-01	NA	NA	4E-04	1E-03
Mercury	8.4E-03	8.9E-03	1	5.9E-08	6.3E-08	1.4E-07	1.5E-07	NA	3.0E-04	NA	NA	5E-04	5E-04
Nickel	9.0E-01	2.2E+00	1	6.4E-06	1.5E-05	1.5E-05	3.6E-05	NA	2.0E-02	NA	NA	7E-04	2E-03
Silver	1.4E-01	2.0E-01	1	9.9E-07	1.4E-06	2.3E-06	3.2E-06	NA	5.0E-03	NA	NA	5E-04	6E-04
Zinc	1.3E+01	2.1E+01	1	9.0E-05	1.5E-04	2.1E-04	3.4E-04	NA	3.0E-01	NA	NA	7E-04	1E-03
SEMIVOLATILES													
Anthracene	5.6E-04	1.3E-03	1	4.0E-09	9.4E-09	9.2E-09	2.2E-08	NA	3.0E-01	NA	NA	3E-08	7E-08
Benzofluoranthene	3.0E-03	1.2E-02	1	2.1E-08	8.5E-08	4.9E-08	2.0E-07	7.3E+00	NA	2E-07	6E-07	NA	NA
Benzotriazole	2.1E-02	8.1E-02	1	1.5E-07	5.7E-07	3.5E-07	1.3E-06	NA	NA	NA	NA	NA	NA
Benzotriazole, chlorinated	3.1E-03	8.4E-03	1	2.2E-08	5.9E-08	5.2E-08	1.4E-07	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.9E-03	7.8E-03	1	1.3E-08	5.5E-08	3.1E-08	1.3E-07	7.3E+00	NA	1E-07	4E-07	NA	NA
Benzo(a)pyrene	6.5E-04	4.4E-03	1	4.6E-09	3.1E-08	1.1E-08	7.3E-08	7.3E+00	NA	3E-08	2E-07	NA	NA
Benzo(e)pyrene	1.8E-03	7.1E-03	1	1.2E-08	5.0E-08	2.9E-08	1.2E-07	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	4.9E-04	4.3E-03	1	3.5E-09	3.0E-08	8.1E-09	7.1E-08	NA	NA	NA	NA	NA	NA
Chrysene	3.4E-03	8.7E-03	1	2.4E-08	6.1E-08	5.6E-08	1.4E-07	7.3E+00	NA	2E-07	4E-07	NA	NA
Coronene	1.7E-04	5.2E-04	1	1.2E-09	3.7E-09	2.8E-09	8.6E-09	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	2.8E-04	1.3E-03	1	2.0E-09	9.0E-09	4.6E-09	2.1E-08	7.3E+00	NA	1E-08	7E-08	NA	NA
Fluoranthene	1.5E-02	4.1E-02	1	1.0E-07	2.9E-07	2.4E-07	6.7E-07	NA	4.0E-02	NA	NA	6E-06	2E-05
Fluorene	5.8E-04	1.4E-03	1	4.1E-09	1.0E-08	9.5E-09	2.4E-08	NA	4.0E-02	NA	NA	2E-07	6E-07
Indeno(1,2,3-cd)pyrene	4.9E-04	2.6E-03	1	3.5E-09	1.8E-08	8.1E-09	4.3E-08	7.3E+00	NA	3E-08	1E-07	NA	NA
Perylene	4.1E-04	2.3E-03	1	2.9E-09	1.6E-08	6.8E-09	3.7E-08	NA	NA	NA	NA	NA	NA
Phenanthrene	2.1E-03	7.7E-03	1	1.5E-08	5.5E-08	3.5E-08	1.3E-07	NA	NA	NA	NA	NA	NA
Pyrene	1.3E-02	2.8E-02	1	9.2E-08	2.0E-07	2.2E-07	4.7E-07	NA	3.0E-02	NA	NA	7E-06	2E-05

TABLE D-3 (cont.)
SCENARIO 3 – RESIDENTIAL (OFF-SITE)
EXPOSURE AND RISK ESTIMATES
INGESTION OF SHELLFISH (CLAMS)
NCBC DAVISVILLE – SITE 09

Constituent	Tissue Concentrations (a): Geometric Mean Clam Concentration (mg/kg)	Tissue Concentrations (a): Maximum Clam Concentration (mg/kg)	Exposure Estimates: Relative Absorption Factor (--)	Exposure Estimates: Mean Dose (Cancer) (mg/kg-d)	Exposure Estimates: RME Dose (Cancer) (mg/kg-d)	Exposure Estimates: Mean Dose (Noncancer) (mg/kg-d)	Exposure Estimates: RME Dose (Noncancer) (mg/kg-d)	Toxicity Values: Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Toxicity Values: Noncancer Chronic Reference Dose (Oral) (mg/kg-d)	Risk Estimates: Mean Cancer Risk (--)	Risk Estimates: RME Cancer Risk (--)	Risk Estimates: Mean Hazard Quotient (--)	Risk Estimates: RME Hazard Quotient (--)
PESTICIDES/PCBs													
BHC, alpha-	6.1E-05	8.0E-05	1	4.3E-10	5.7E-10	1.0E-09	1.3E-09	6.3E+00	3.0E-04	3E-09	4E-09	3E-06	4E-06
BHC, gamma-	6.2E-05	1.3E-04	1	4.4E-10	9.0E-10	1.0E-09	2.1E-09	1.3E+00	3.0E-04	6E-10	1E-09	3E-06	7E-06
Chlordane, alpha	1.8E-04	4.2E-04	0.3	3.9E-10	8.8E-10	9.0E-10	2.1E-09	1.3E+00	6.0E-05	5E-10	1E-09	1E-05	3E-05
Chlordane, gamma-	2.0E-04	5.4E-04	0.3	4.2E-10	1.1E-09	9.9E-10	2.6E-09	1.3E+00	6.0E-05	6E-10	1E-09	2E-05	4E-05
DDD, 4,4'-	3.3E-04	7.0E-03	0.3	6.9E-10	1.5E-08	1.6E-09	3.4E-08	2.4E-01	5.0E-04	2E-10	4E-09	3E-06	7E-05
DDE, 4,4'-	1.8E-04	9.5E-04	0.3	3.9E-10	2.0E-09	9.1E-10	4.7E-09	3.4E-01	5.0E-04	1E-10	7E-10	2E-06	9E-06
DDT, 4,4'-	1.2E-04	1.1E-03	0.3	2.6E-10	2.4E-09	6.0E-10	5.6E-09	3.4E-01	5.0E-04	9E-11	8E-10	1E-06	1E-05
Hexachlorobenzene	7.6E-05	1.5E-04	1	5.4E-10	1.0E-09	1.3E-09	2.4E-09	1.6E+00	8.0E-04	9E-10	2E-09	2E-06	3E-06
Aroclor-1242	8.7E-04	2.3E-03	0.3	1.8E-09	4.9E-09	4.3E-09	1.1E-08	7.7E+00	NA	1E-08	4E-08	NA	NA
Aroclor-1254	3.7E-02	1.1E-01	0.3	7.8E-08	2.3E-07	1.8E-07	5.4E-07	7.7E+00	NA	6E-07	2E-06	NA	NA

(a) Concentrations in clams collected in Allen Harbor

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	7E-06	1E-05	3E-02	6E-02

[shaded] = Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x IR x FI X RAF x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Constituent Concentration in Clam Tissue (CT) =	CS mg/kg
Unit Conversion (UC) =	1E-06 kg/mg
Ingestion Rate (IR) =	1200 mg/d
Fraction Ingested at Locations Near Site (FI) =	1 (--)
Relative Absorption Factor (RAF) =	CS Constituent-specific (--)
Exposure Frequency (EF) =	350 d/yr
Exposure Duration (ED) =	30 yr
Body Weight (BW) =	70 kg
Averaging Time (AT) =	25550 d (cancer) 10950 d (noncancer)

TABLE D-3 (cont.)
SCENARIO 3 - FUTURE SHELLFISHING (OFF-SITE ADULTS)
CANCER RISK ESTIMATES USING ALTERNATE INGESTION RATES
INGESTION OF SHELLFISH (CLAMS)
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
INORGANICS		
Arsenic	2E-06	4E-06
Cadmium	NA	NA
Chromium III	NA	NA
Chromium VI	NA	NA
Copper	NA	NA
Lead	NA	NA
Manganese	NA	NA
Mercury	NA	NA
Nickel	NA	NA
Silver	NA	NA
Zinc	NA	NA
SEMIVOLATILES		
Anthracene	NA	NA
Benzo(b/k)fluoranthene	6E-08	2E-07
Benzotriazole	NA	NA
Benzotriazole, chlorinated	NA	NA
Benzo(a)anthracene	4E-08	1E-07
Benzo(a)pyrene	1E-08	8E-08
Benzo(e)pyrene	NA	NA
Benzo(ghi)perylene	NA	NA
Chrysene	6E-08	2E-07
Coronene	NA	NA
Dibenzo(a,h)anthracene	5E-09	2E-08
Fluoranthene	NA	NA
Fluorene	NA	NA
Indeno(1,2,3-cd)pyrene	9E-09	5E-08
Perylene	NA	NA
Phenanthrene	NA	NA
Pyrene	NA	NA

TABLE D-3 (cont.)
SCENARIO 3 - FUTURE SHELLFISHING (OFF-SITE ADULTS)
CANCER RISK ESTIMATES USING ALTERNATE INGESTION RATES
INGESTION OF SHELLFISH (CLAMS)
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
PESTICIDES/PCBs		
BHC, alpha-	1E-09	1E-09
BHC, gamma-	2E-10	4E-10
Chlordane, alpha	2E-10	4E-10
Chlordane, gamma-	2E-10	5E-10
DDD, 4,4'-	6E-11	1E-09
DDE, 4,4'-	5E-11	3E-10
DDT, 4,4'-	3E-11	3E-10
Hexachlorobenzene	3E-10	6E-10
Aroclor-1242	5E-09	1E-08
Aroclor-1254	2E-07	7E-07

	Mean Cancer Risk	RME Cancer Risk
TOTAL:	3E-06	5E-06

[shaded box] = Cancer risk > 1E-06

TABLE D-3 (cont.)
SCENARIO 3 – FUTURE SHELLFISHING (OFF-SITE ADULTS)
EXPOSURE AND RISK ESTIMATES
INGESTION OF SHELLFISH (MUSSELS)
NCBC DAVISVILLE – SITE 09

Constituent	Tissue Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
	Geometric Mean Mussel Concentration (mg/kg)	Maximum Mussel Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Chronic Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Arsenic	4.0E-01	6.4E-01	1	2.8E-06	4.5E-06	6.5E-06	1.1E-05	1.8E+00	3.0E-04	5E-06	8E-06	2E-02	4E-02
Cadmium	1.2E-01	2.3E-01	1	8.4E-07	1.6E-06	2.0E-06	3.8E-06	NA	1.0E-03	NA	NA	2E-03	4E-03
Chromium III	1.3E-01	4.0E-01	1	9.3E-07	2.8E-06	2.2E-06	6.5E-06	NA	1.0E+00	NA	NA	2E-06	7E-06
Chromium VI	1.9E-02	5.7E-02	1	1.3E-07	4.0E-07	3.1E-07	9.3E-07	NA	5.0E-03	NA	NA	6E-05	2E-04
Copper	1.1E+00	2.2E+00	1	7.4E-06	1.5E-05	1.7E-05	3.5E-05	NA	3.7E-02	NA	NA	5E-04	1E-03
Lead	4.5E-01	6.1E-01	0.3	9.5E-07	1.3E-06	2.2E-06	3.0E-06	NA	NA	NA	NA	NA	NA
Manganese	4.5E+00	1.2E+01	1	3.1E-05	8.4E-05	7.3E-05	2.0E-04	NA	1.4E-01	NA	NA	5E-04	1E-03
Nickel	2.4E-01	8.3E-01	1	1.7E-06	5.9E-06	3.9E-06	1.4E-05	NA	2.0E-02	NA	NA	2E-04	7E-04
Silver	2.6E-02	2.6E-02	1	1.8E-07	1.9E-07	4.3E-07	4.3E-07	NA	5.0E-03	NA	NA	9E-05	9E-05
Zinc	1.1E+01	2.3E+01	1	7.7E-05	1.6E-04	1.8E-04	3.7E-04	NA	3.0E-01	NA	NA	6E-04	1E-03
SEMIVOLATILES													
Anthracene	1.5E-03	2.9E-03	1	1.1E-08	2.1E-08	2.5E-08	4.8E-08	NA	3.0E-01	NA	NA	8E-08	2E-07
Benzofluoranthene	5.9E-03	8.4E-03	1	4.1E-08	5.9E-08	9.7E-08	1.4E-07	7.3E+00	NA	3E-07	4E-07	NA	NA
Benzotriazole	4.5E-02	1.1E-01	1	3.2E-07	7.6E-07	7.5E-07	1.8E-06	NA	NA	NA	NA	NA	NA
Benzotriazole, chlorinated	5.2E-03	1.9E-02	1	3.7E-08	1.3E-07	8.5E-08	3.0E-07	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	2.8E-03	6.1E-03	1	2.0E-08	4.3E-08	4.6E-08	9.9E-08	7.3E+00	NA	1E-07	3E-07	NA	NA
Benzo(a)pyrene	7.6E-04	1.1E-03	1	5.3E-09	8.0E-09	1.2E-08	1.9E-08	7.3E+00	NA	4E-08	6E-08	NA	NA
Benzo(e)pyrene	5.3E-03	7.4E-03	1	3.7E-08	5.2E-08	8.7E-08	1.2E-07	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	9.0E-04	1.8E-03	1	6.4E-09	1.3E-08	1.5E-08	3.0E-08	NA	NA	NA	NA	NA	NA
Chrysene	8.1E-03	1.2E-02	1	5.7E-08	8.2E-08	1.3E-07	1.9E-07	7.3E+00	NA	4E-07	6E-07	NA	NA
Coronene	1.5E-04	4.5E-04	1	1.1E-09	3.2E-09	2.5E-09	7.4E-09	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	2.7E-04	4.5E-04	1	1.9E-09	3.2E-09	4.5E-09	7.4E-09	7.3E+00	NA	1E-08	2E-08	NA	NA
Fluoranthene	4.9E-02	8.9E-02	1	3.5E-07	6.3E-07	8.1E-07	1.5E-06	NA	4.0E-02	NA	NA	2E-05	4E-05
Fluorene	1.4E-03	3.7E-03	1	1.0E-08	2.6E-08	2.3E-08	6.1E-08	NA	4.0E-02	NA	NA	6E-07	2E-06
Indeno(1,2,3-cd)pyrene	6.0E-04	1.1E-03	1	4.2E-09	7.6E-09	9.8E-09	1.8E-08	7.3E+00	NA	3E-08	6E-08	NA	NA
Perylene	8.1E-04	1.4E-03	1	5.7E-09	9.6E-09	1.3E-08	2.3E-08	NA	NA	NA	NA	NA	NA
Phenanthrene	3.5E-03	1.3E-02	1	2.5E-08	9.3E-08	5.8E-08	2.2E-07	NA	NA	NA	NA	NA	NA
Pyrene	3.4E-02	6.1E-02	1	2.4E-07	4.3E-07	5.5E-07	1.0E-06	NA	3.0E-02	NA	NA	2E-05	3E-05

TABLE D-3 (cont.)
SCENARIO 3 - RESIDENTIAL (OFF-SITE)
EXPOSURE AND RISK ESTIMATES
INGESTION OF SHELLFISH (MUSSELS)
NCBC DAVISVILLE - SITE 09

Constituent	Tissue Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
	Geometric Mean Mussel Concentration (mg/kg)	Maximum Mussel Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Chronic Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
PESTICIDES/PCBs													
BHC, alpha-	1.6E-04	3.0E-04	1	1.1E-09	2.1E-09	2.6E-09	4.9E-09	6.3E+00	3.0E-04	7E-09	1E-08	9E-06	2E-05
BHC, gamma-	1.7E-04	5.5E-04	1	1.2E-09	3.9E-09	2.8E-09	9.1E-09	1.3E+00	3.0E-04	2E-09	5E-09	9E-06	3E-05
Chlordane, alpha	7.5E-04	1.7E-03	0.3	1.6E-09	3.5E-09	3.7E-09	8.1E-09	1.3E+00	6.0E-05	2E-09	5E-09	6E-05	1E-04
Chlordane, gamma-	8.3E-04	1.8E-03	0.3	1.8E-09	3.7E-09	4.1E-09	8.7E-09	1.3E+00	6.0E-05	2E-09	5E-09	7E-05	1E-04
DDD, 4,4'-	1.7E-03	2.9E-03	0.3	3.5E-09	6.1E-09	8.2E-09	1.4E-08	2.4E-01	5.0E-04	8E-10	1E-09	2E-05	3E-05
DDE, 4,4'-	1.0E-03	2.7E-03	0.3	2.1E-09	5.7E-09	5.0E-09	1.3E-08	3.4E-01	5.0E-04	7E-10	2E-09	1E-05	3E-05
DDT, 4,4'-	2.2E-04	6.3E-04	0.3	4.7E-10	1.3E-09	1.1E-09	3.1E-09	3.4E-01	5.0E-04	2E-10	5E-10	2E-06	6E-06
Hexachlorobenzene	8.0E-05	1.5E-04	1	5.6E-10	1.0E-09	1.3E-09	2.4E-09	1.6E+00	8.0E-04	9E-10	2E-09	2E-06	3E-06
Aroclor-1242	4.7E-03	9.6E-03	0.3	9.8E-09	2.0E-08	2.3E-08	4.8E-08	7.7E+00	NA	8E-08	2E-07	NA	NA
Aroclor-1254	1.2E-01	2.0E-01	0.3	2.5E-07	4.1E-07	5.9E-07	9.6E-07	7.7E+00	NA	2E-06	3E-06	NA	NA

(a) Concentrations in mussels collected in Allen Harbor

Where:

Dose = [Concentration x UC x IR x FI X RAF x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Constituent Concentration in Shellfish Tissue (CT) = CS mg/kg
Unit Conversion (UC) = 1E-06 kg/mg
Fraction Ingested at Locations Near Site (FI) = 1 (--)
Ingestion Rate (IR) = 1200 mg/d
Relative Absorption Factor (RAF) = CS Constituent-specific (--)
Exposure Frequency (EF) = 350 d/yr
Exposure Duration (ED) = 30 yr
Body Weight (BW) = 70 kg
Averaging Time (AT) = 25550 d (cancer)
10950 d (noncancer)

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	8E-06	1E-05	3E-02	4E-02

= Cancer risk > 1E-06 or hazard quotient/index > 1E+00

TABLE D-3 (cont.)
SCENARIO 3 – FUTURE SHELLFISHING (OFF-SITE ADULTS)
CANCER RISK ESTIMATES USING ALTERNATE INGESTION RATES
INGESTION OF SHELLFISH (MUSSELS)
NCBC DAVISVILLE – SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
INORGANICS		
Arsenic	5E-08	9E-08
Cadmium	NA	NA
Chromium III	NA	NA
Chromium VI	NA	NA
Copper	NA	NA
Lead	NA	NA
Manganese	NA	NA
Nickel	NA	NA
Silver	NA	NA
Zinc	NA	NA
SEMIVOLATILES		
Anthracene	NA	NA
Benzofluoranthene	3E-09	5E-09
Benzotriazole	NA	NA
Benzotriazole, chlorinated	NA	NA
Benzo(a)anthracene	2E-09	3E-09
Benzo(a)pyrene	4E-10	6E-10
Benzo(e)pyrene	NA	NA
Benzo(ghi)perylene	NA	NA
Chrysene	5E-09	7E-09
Coronene	NA	NA
Dibenzo(a,h)anthracene	2E-10	3E-10
Fluoranthene	NA	NA
Fluorene	NA	NA
Indeno(1,2,3-cd)pyrene	3E-10	6E-10
Perylene	NA	NA
Phenanthrene	NA	NA
Pyrene	NA	NA

TABLE D-3 (cont.)
SCENARIO 3 - FUTURE SHELLFISHING (OFF-SITE ADULTS)
CANCER RISK ESTIMATES USING ALTERNATE INGESTION RATES
INGESTION OF SHELLFISH (MUSSELS)
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
PESTICIDES/PCBs		
BHC, alpha-	8E-11	1E-10
BHC, gamma-	2E-11	6E-11
Chlordane, alpha	2E-11	5E-11
Chlordane, gamma-	2E-11	5E-11
DDD, 4,4'-	9E-12	2E-11
DDE, 4,4'-	8E-12	2E-11
DDT, 4,4'-	2E-12	5E-12
Hexachlorobenzene	1E-11	2E-11
Aroclor-1242	8E-10	2E-09
Aroclor-1254	2E-08	3E-08

	Mean Cancer Risk	RME Cancer Risk
TOTAL:	9E-08	1E-07

= Cancer risk > 1E-06

^ Carcinogenic PAH

TABLE D-3 (cont.)
SCENARIO 3 – FUTURE SHELLFISHING (OFF-SITE ADULTS)
EXPOSURE AND RISK ESTIMATES
INGESTION OF SHELLFISH (OYSTERS)
NCBC DAVISVILLE – SITE 09

Constituent	Tissue Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
	Geometric Mean Oyster Concentration (mg/kg)	Maximum Oyster Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Chronic Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
INORGANICS													
Arsenic	3.2E-01	4.0E-01	1	2.3E-06	2.8E-06	5.3E-06	6.5E-06	1.8E+00	3.0E-04	4E-06	5E-06	2E-02	2E-02
Cadmium	5.2E-01	6.4E-01	1	3.7E-06	4.5E-06	8.6E-06	1.1E-05	NA	1.0E-03	NA	NA	9E-03	1E-02
Chromium III	4.0E-02	4.7E-02	1	2.8E-07	3.3E-07	6.6E-07	7.7E-07	NA	1.0E+00	NA	NA	7E-07	8E-07
Chromium VI	5.7E-03	6.7E-03	1	4.0E-08	4.7E-08	9.4E-08	1.1E-07	NA	5.0E-03	NA	NA	2E-05	2E-05
Copper	7.9E+01	1.1E+02	1	5.5E-04	7.4E-04	1.3E-03	1.7E-03	NA	3.7E-02	NA	NA	3E-02	5E-02
Lead	1.7E-01	2.5E-01	0.3	3.7E-07	5.3E-07	8.6E-07	1.2E-06	NA	NA	NA	NA	NA	NA
Manganese	1.1E+00	1.3E+00	1	7.5E-06	9.0E-06	1.8E-05	2.1E-05	NA	1.4E-01	NA	NA	1E-04	2E-04
Nickel	2.8E-01	4.4E-01	1	2.0E-06	3.1E-06	4.7E-06	7.3E-06	NA	2.0E-02	NA	NA	2E-04	4E-04
Silver	1.5E-01	7.1E-01	1	1.0E-06	5.0E-06	2.4E-06	1.2E-05	NA	5.0E-03	NA	NA	5E-04	2E-03
Zinc	5.0E+02	5.4E+02	1	3.5E-03	3.8E-03	8.3E-03	8.9E-03	NA	3.0E-01	NA	NA	3E-02	3E-02
SEMIVOLATILES													
Anthracene	8.4E-04	9.6E-04	1	5.9E-09	6.8E-09	1.4E-08	1.6E-08	NA	3.0E-01	NA	NA	5E-08	5E-08
Benzofluoranthene	2.7E-03	3.0E-03	1	1.9E-08	2.1E-08	4.5E-08	4.9E-08	7.3E+00	NA	1E-07	2E-07	NA	NA
Benzotriazole	1.4E-03	2.1E-03	1	9.7E-09	1.5E-08	2.3E-08	3.4E-08	NA	NA	NA	NA	NA	NA
Benzotriazole, chlorinated	6.6E-04	7.5E-04	1	4.6E-09	5.2E-09	1.1E-08	1.2E-08	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	5.8E-03	7.2E-03	1	4.1E-08	5.1E-08	9.5E-08	1.2E-07	7.3E+00	NA	3E-07	4E-07	NA	NA
Benzo(a)pyrene	1.7E-04	2.2E-04	1	1.2E-09	1.5E-09	2.9E-09	3.5E-09	7.3E+00	NA	9E-09	1E-08	NA	NA
Benzo(e)pyrene	1.8E-03	2.3E-03	1	1.3E-08	1.6E-08	3.0E-08	3.8E-08	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	1.4E-04	2.3E-04	1	1.0E-09	1.6E-09	2.4E-09	3.8E-09	NA	NA	NA	NA	NA	NA
Chrysene	1.0E-02	1.2E-02	1	7.3E-08	8.7E-08	1.7E-07	2.0E-07	7.3E+00	NA	5E-07	6E-07	NA	NA
Coronene	4.5E-05	7.2E-05	1	3.2E-10	5.1E-10	7.4E-10	1.2E-09	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	3.3E-05	4.5E-05	1	2.3E-10	3.2E-10	5.4E-10	7.4E-10	7.3E+00	NA	2E-09	2E-09	NA	NA
Fluoranthene	4.9E-02	6.0E-02	1	3.4E-07	4.3E-07	8.0E-07	9.9E-07	NA	4.0E-02	NA	NA	2E-05	2E-05
Fluorene	1.4E-03	1.6E-03	1	1.0E-08	1.1E-08	2.3E-08	2.6E-08	NA	4.0E-02	NA	NA	6E-07	6E-07
Indeno(1,2,3-cd)pyrene	4.8E-05	8.3E-05	1	3.4E-10	5.9E-10	7.9E-10	1.4E-09	7.3E+00	NA	2E-09	4E-09	NA	NA
Perylene	1.8E-04	2.5E-04	1	1.3E-09	1.8E-09	3.0E-09	4.1E-09	NA	NA	NA	NA	NA	NA
Phenanthrene	4.6E-03	5.2E-03	1	3.3E-08	3.6E-08	7.6E-08	8.5E-08	NA	NA	NA	NA	NA	NA
Pyrene	2.4E-02	3.0E-02	1	1.7E-07	2.1E-07	3.9E-07	4.9E-07	NA	3.0E-02	NA	NA	1E-05	2E-05

TABLE D-3 (cont.)
SCENARIO 3 - ADULT (18 TO 70 YEARS)
EXPOSURE AND RISK ESTIMATES
INGESTION OF SHELLFISH (OYSTERS)
NCBC DAVISVILLE - SITE 09

	Tissue Concentrations (a)		Exposure Estimates					Toxicity Values		Risk Estimates			
Constituent	Geometric Mean Oyster Concentration (mg/kg)	Maximum Oyster Concentration (mg/kg)	Relative Absorption Factor (--)	Mean Dose (Cancer) (mg/kg-d)	RME Dose (Cancer) (mg/kg-d)	Mean Dose (Noncancer) (mg/kg-d)	RME Dose (Noncancer) (mg/kg-d)	Cancer Slope Factor (Oral) $(mg/kg-d)^{-1}$	Noncancer Chronic Reference Dose (Oral) (mg/kg-d)	Mean Cancer Risk (--)	RME Cancer Risk (--)	Mean Hazard Quotient (--)	RME Hazard Quotient (--)
PESTICIDES/PCBs													
BHC, alpha-	1.2E-04	1.3E-04	1	8.4E-10	9.1E-10	2.0E-09	2.1E-09	6.3E+00	3.0E-04	5E-09	6E-09	7E-06	7E-06
BHC, gamma-	8.3E-05	9.8E-05	1	5.8E-10	6.9E-10	1.4E-09	1.6E-09	1.3E+00	3.0E-04	8E-10	9E-10	5E-06	5E-06
Chlordane, alpha	1.4E-03	1.6E-03	0.3	3.0E-09	3.3E-09	7.1E-09	7.7E-09	1.3E+00	6.0E-05	4E-09	4E-09	1E-04	1E-04
Chlordane, gamma-	1.5E-03	1.7E-03	0.3	3.2E-09	3.6E-09	7.4E-09	8.3E-09	1.3E+00	6.0E-05	4E-09	5E-09	1E-04	1E-04
DDD, 4,4'-	5.2E-04	1.1E-03	0.3	1.1E-09	2.4E-09	2.6E-09	5.6E-09	2.4E-01	5.0E-04	3E-10	6E-10	5E-06	1E-05
DDE, 4,4'-	3.9E-03	4.8E-03	0.3	8.2E-09	1.0E-08	1.9E-08	2.4E-08	3.4E-01	5.0E-04	3E-09	3E-09	4E-05	5E-05
DDT, 4,4'-	4.0E-03	4.4E-03	0.3	8.5E-09	9.2E-09	2.0E-08	2.2E-08	3.4E-01	5.0E-04	3E-09	3E-09	4E-05	4E-05
Hexachlorobenzene	3.7E-05	2.8E-05	1	2.6E-10	2.0E-10	6.0E-10	4.7E-10	1.6E+00	8.0E-04	4E-10	3E-10	8E-07	6E-07
Aroclor-1242	5.7E-03	7.8E-03	0.3	1.2E-08	1.6E-08	2.8E-08	3.8E-08	7.7E+00	NA	9E-08	1E-07	NA	NA
Aroclor-1254	1.8E-01	1.9E-01	0.3	3.9E-07	4.1E-07	9.1E-07	9.5E-07	7.7E+00	NA	3E-06	3E-06	NA	NA

(a) Concentrations in oysters collected in Allen Harbor

	Mean Cancer Risk	RME Cancer Risk	Mean Hazard Index	RME Hazard Index
TOTAL:	8E-06	9E-06	9E-02	1E-01

[shaded] = Cancer risk > 1E-06 or hazard quotient/index > 1E+00

Where:

Dose = [Concentration x UC x IR x FI x RAF x EF x ED] / [BW x AT]
Cancer Risk = Dose x Slope Factor
Hazard Quotient = Dose / Reference Dose

Constituent Concentration in Shellfish Tissue (CT) =	CS mg/kg
Unit Conversion (UC) =	1E-06 kg/mg
Ingestion Rate (IR) =	1200 mg/d
Fraction Ingested from Locations Near Site (FI) =	1 (--)
Relative Absorption Factor (RAF) =	CS Constituent-specific (--)
Exposure Frequency (EF) =	350 d/yr
Exposure Duration (ED) =	30 yr
Body Weight (BW) =	70 kg
Averaging Time (AT) =	25550 d (cancer) 10950 d (noncancer)

TABLE D-3 (cont.)
SCENARIO 3 - FUTURE SHELLFISHING (OFF-SITE ADULTS)
CANCER RISK ESTIMATES USING ALTERNATE INGESTION RATES
INGESTION OF SHELLFISH (OYSTERS)
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
INORGANICS		
Arsenic	4E-08	5E-08
Cadmium	NA	NA
Chromium III	NA	NA
Chromium VI	NA	NA
Copper	NA	NA
Lead	NA	NA
Manganese	NA	NA
Nickel	NA	NA
Silver	NA	NA
Zinc	NA	NA
SEMIVOLATILES		
Anthracene	NA	NA
Benzofluoranthene	2E-09	2E-09
Benzotriazole	NA	NA
Benzotriazole, chlorinated	NA	NA
Benzo(a)anthracene	3E-09	4E-09
Benzo(a)pyrene	1E-10	1E-10
Benzo(e)pyrene	NA	NA
Benzo(ghi)perylene	NA	NA
Chrysene	6E-09	7E-09
Coronene	NA	NA
Dibenzo(a,h)anthracene	2E-11	3E-11
Fluoranthene	NA	NA
Fluorene	NA	NA
Indeno(1,2,3-cd)pyrene	3E-11	5E-11
Perylene	NA	NA
Phenanthrene	NA	NA
Pyrene	NA	NA

TABLE D-3 (cont.)
SCENARIO 3 - FUTURE SHELLFISHING (OFF-SITE ADULTS)
CANCER RISK ESTIMATES USING ALTERNATE INGESTION RATES
INGESTION OF SHELLFISH (OYSTERS)
NCBC DAVISVILLE - SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
INORGANICS		
Arsenic	1E-06	1E-06
Cadmium	NA	NA
Chromium III	NA	NA
Chromium VI	NA	NA
Copper	NA	NA
Lead	NA	NA
Manganese	NA	NA
Nickel	NA	NA
Silver	NA	NA
Zinc	NA	NA
SEMIVOLATILES		
Anthracene	NA	NA
Benzofluoranthene	3E-08	4E-08
Benzotriazole	NA	NA
Benzotriazole, chlorinated	NA	NA
Benzo(a)anthracene	7E-08	9E-08
Benzo(a)pyrene	2E-09	3E-09
Benzo(e)pyrene	NA	NA
Benzo(ghi)perylene	NA	NA
Chrysene	1E-07	2E-07
Coronene	NA	NA
Dibenzo(a,h)anthracene	4E-10	6E-10
Fluoranthene	NA	NA
Fluorene	NA	NA
Indeno(1,2,3-cd)pyrene	6E-10	1E-09
Perylene	NA	NA
Phenanthrene	NA	NA
Pyrene	NA	NA

TABLE D-3 (cont.)
SCENARIO 3 – FUTURE SHELLFISHING (OFF-SITE ADULTS)
CANCER RISK ESTIMATES USING ALTERNATE INGESTION RATES
INGESTION OF SHELLFISH (OYSTERS)
NCBC DAVISVILLE – SITE 09

Constituent	Mean Cancer Risk (--)	RME Cancer Risk (--)
PESTICIDES/PCBs		
BHC, alpha-	1E-09	1E-09
BHC, gamma-	2E-10	2E-10
Chlordane, alpha	1E-09	1E-09
Chlordane, gamma-	1E-09	1E-09
DDD, 4,4'-	6E-11	1E-10
DDE, 4,4'-	7E-10	8E-10
DDT, 4,4'-	7E-10	8E-10
Hexachlorobenzene	1E-10	8E-11
Aroclor-1242	2E-08	3E-08
Aroclor-1254	7E-07	8E-07

	Mean Cancer Risk	RME Cancer Risk
TOTAL:	2E-06	2E-06

[shaded] = Cancer risk > 1E-06